(2)

NAVAL POSTGRADUATE SCHOOL

Monterey, California

THESIS

TESTING A WHEELED LANDING GEAR SYSTEM FOR THE TH-57 HELICOPTER

by

LT Nancy L. Heckman

December 1992

Thesis Advisor: Ramesh Kolar

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION Naval Postgraduate School 6b. OFFICE SYMBOL (*If applicable*) 55	7a. NAME OF MONITORING ORGANIZATION Naval Postgraduate School
6c. ADDRESS (*City, State, and ZIP Code*) Monterey, CA 93943-5000	7b. ADDRESS (*City, State, and ZIP Code*) Monterey, CA 93943-5000
8a. NAME OF FUNDING/SPONSORING ORGANIZATION 8b. OFFICE SYMBOL (*If applicable*)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (*City, State, and ZIP Code*)	10. SOURCE OF FUNDING NUMBERS Program Element No / Project No / Task No. / Work Unit Accession Number

11. TITLE (*Include Security Classification*)
TESTING A WHEELED LANDING GEAR SYSTEM FOR THE TH 57 HELICOPTER

12. PERSONAL AUTHOR(S) Heckman, Nancy L.

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (*year, month, day*)	15. PAGE COUNT
Master's Thesis	From To	DECEMBER 1992	174

16. SUPPLEMENTARY NOTATION
The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

17. COSATI CODES			18. SUBJECT TERMS (*continue on reverse if necessary and identify by block number*)
FIELD	GROUP	SUBGROUP	Helicopter Wheeled Landing Gear Systems

19. ABSTRACT (*continue on reverse if necessary and identify by block number*)

Using the main gear from a Cessna 182 and the nose gear from a Grumman AA1-B, a comparison with the skid gear currently installed on the TH-57 was conducted. The initial comparison was done using a structural analysis program, GIFTS, to simultaneously analyze and compare gear systems. Experimental data from the skid gear was used to verify program results. Experimental testing was conducted for further code validation and analysis of each system's advantages and disadvantages. While the benefits of a wheeled gear system merit further study, the system analyzed requires modification to eliminate premature failure of the nose wheel attachment tube.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION	
☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS REPORT ☐ DTIC USERS	UNCLASSIFIED	
22a. NAME OF RESPONSIBLE INDIVIDUAL RAMESH KOLAR	22b. TELEPHONE (*Include Area code*) (408) 646-2936	22c. OFFICE SYMBOL AA/KJ

DD FORM 1473, 84 MAR — 83 APR edition may be used until exhausted. All other editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE
UNCLASSIFIED

Approved for public release; distribution is unlimited.

Testing a Wheeled Landing
Gear System for the TH-57 Helicopter

by

Nancy L. Heckman
Lieutenant, United States Navy
B.S., United States Naval Academy, 1985

Submitted in partial fulfillment
of the requirements for the degree of

MASTER OF SCIENCE IN AERONAUTICAL ENGINEERING

from the

NAVAL POSTGRADUATE SCHOOL
December 1992

Author: _____
Nancy L. Heckman

Approved by: _____
Ramesh Kolar, Thesis Advisor

_____
Gerald H. Lindsey, Second Reader

_____
Daniel J. Collins, Chairman
Department of Aeronautics and Astronautics

Abstract

Using the main gear from a Cessna 182 and the nose gear from a Grumman AA1-B, (patent pending) a comparison with the skid gear currently installed on the TH-57 helicopters was conducted. The initial comparison was done using a structural analysis program, GIFTS, to simultaneously analyze and compare the gear systems. Experimental data was used to verify program results. Experimental testing was conducted for further code validation and analysis of each system's advantages and disadvantages. While the benefits of a wheeled system merit further study, the system analyzed requires modification to eliminate premature failure of the nose wheel attachment tube.

TABLE OF CONTENTS

I. INTRODUCTION

A. PURPOSE

Aircraft in general and helicopters in particular have landing gear for a number of reasons including:

- Transmission of a portion of the landing loads to the airframe.
- Aircraft towing.
- Protection of the runway and taxiway surface from damage.
- Absorption of landing and taxiing shocks.
- Braking.
- Providing for ability for ground maneuvering, (taxiing, take-off roll, landing roll and steering).

The current landing gear of the TH-57 can provide only the last two of these functions due to its skid configuration (Roskam, 1986). Despite these limitations, the Navy has historically conducted the training of all its helicopter pilots in the TH-57.

The landing gear is subject to the following loads (Roskam, 1986):

- Vertical loads from landing, autorotation, and taxiing.
- Longitudinal loads (most notably rotor engagement/disengagement loads).
- Lateral loads from crabbed landings and ground turning.

The question to be addressed in this thesis is whether the advantages of skidded gear outweigh the disadvantages sufficiently for the Navy to adopt the alternative system, which is a wheeled gear system.

B. THESIS OVERVIEW

The entire testing program was divided into five phases and culminated in the comparison of the benefits and drawbacks of the old skid gear and the proposed wheeled gear system. Based upon this comparison, recommendations were made for improvement and incorporation into the TH-57 fleet.

1. Phase I - Analysis of Current Skid Landing Gear System

Using the Graphical Interactive Finite Element Total System (GIFTS) structural analysis program, which is resident on the Aeronautical Engineering Department computer system, an analysis was conducted of the stresses experienced by each cross tube of the currently installed TH-57 skid gear in a level landing configuration. These results were then compared with the Bell Helicopter Textron experimentally measured results in order to establish the validity of the GIFTS calculations.

2. Phase II - Analysis of the Proposed Wheeled Landing Gear System

The candidate wheeled landing gear system consisted of the main landing gear from a Cessna 182 and the nose gear from a Grumman AA1-B. The GIFTS model procedure, established and validated in Phase I, was repeated for the wheeled gear configuration.

3. Phase III - Preparation and Calibration of Gear System for Testing

Strain gages were mounted near the points of the estimated maximum strain as calculated by the GIFTS program. Once the gear system was instrumented, calibration was conducted under static conditions to ensure proper operation of all equipment.

4. Phase IV - Static Testing

The candidate wheeled gear was loaded to failure in order to experimentally determine the maximum trains at gear failure. The tests were designed to match the GIFTS program conditions.

5. Phase V - Data Reduction

The data collected from the experimental tests were subsequently used for the stress analysis. The primary goals in this phase included comparison with the results from the GIFTS finite element model, identifying possible weak points in the gear system, and an analysis of the comparative advantages and disadvantages of each gear system.

C. DESIGN CONSIDERATIONS

The prime design considerations for the wheeled landing gear included the desire to use previously certified off-the-shelf parts. A fixed gear was chosen over a retractable design for the reasons of simplicity, weight, and cost.

A tricycle gear was chosen over the bicycle option due to its inherent light weight and better steering capabilities. The tail wheel gear type was excluded due to an undesirable high longitudinal attitude while on the ground and the requirement for extensive tail boom modifications.

With these factors in mind, the main gear of a Cessna 182 was chosen because the gross weight of the Cessna was similar to the TH-57, and it could be attached to the helicopter using existing mount points and hardware. The Cessna 182 gear did require the addition of a sleeving cross tube. The Grumman AA1-B nose gear was chosen for its strength and its ability to turn 65° either side of center.

Two structural deficiencies were discovered during testing, which required modification of the original factory design with two welds and two machined parts. Figures 1.1 to 1.3 are views of the helicopter with the wheeled gear installed with Figure 1.4 showing the current skid gear and Figure 1.5 depicting the proposed wheeled gear .

D. FAA REQUIREMENTS

The Federal Aviation Regulations, section 29.471, requires landing gear ground load test conditions to meet the following criteria:

- The limit ground loads obtained in the landing conditions, as defined in 29.471, must be external loads that would occur in the rotorcraft structure if it were acting as a rigid body.
- In each specified landing condition, the external loads must be in equilibrium with linear and angular inertia loads.

- The centers of gravity used during the testing must be selected so that the gear system will have each element subjected to its maximum design load.
- For the specified landing conditions, the design maximum weight must be used. A rotor lift may be assumed to act through the center of gravity throughout the landing impact. This lift may not exceed two thirds of the design maximum weight (FARs, 29.473)

Two dynamic tests were defined in the FARs, however, dynamic testing is not included in this thesis.

E. MILITARY REQUIREMENTS

Four existing documents dictate the requirements for the candidate wheeled landing gear. The first is the Request For Proposal (RFP) which contains the special requirements desired by the service. The second document is MIL-STD-1290A, which includes aircraft crash worthiness and energy absorption criterion, acceptable crash damage and the landing conditions for these tests.

Drop tests are defined in MIL-T-8679 and MIL-S-8698(ASG). These documents delineate ground loading conditions, yield strength for landing, reserve energy requirements, and specific landing test load conditions.

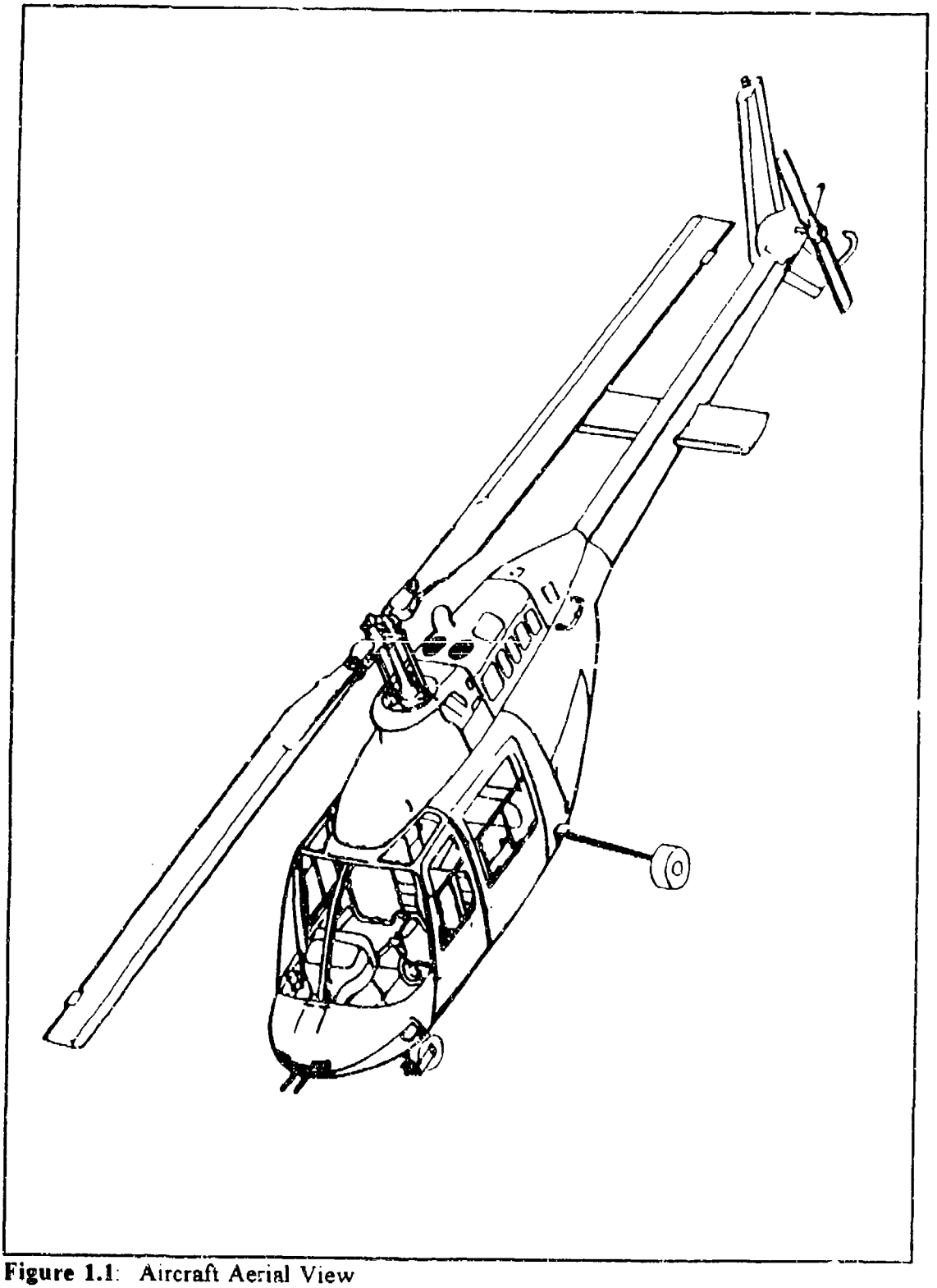


Figure 1.1: Aircraft Aerial View

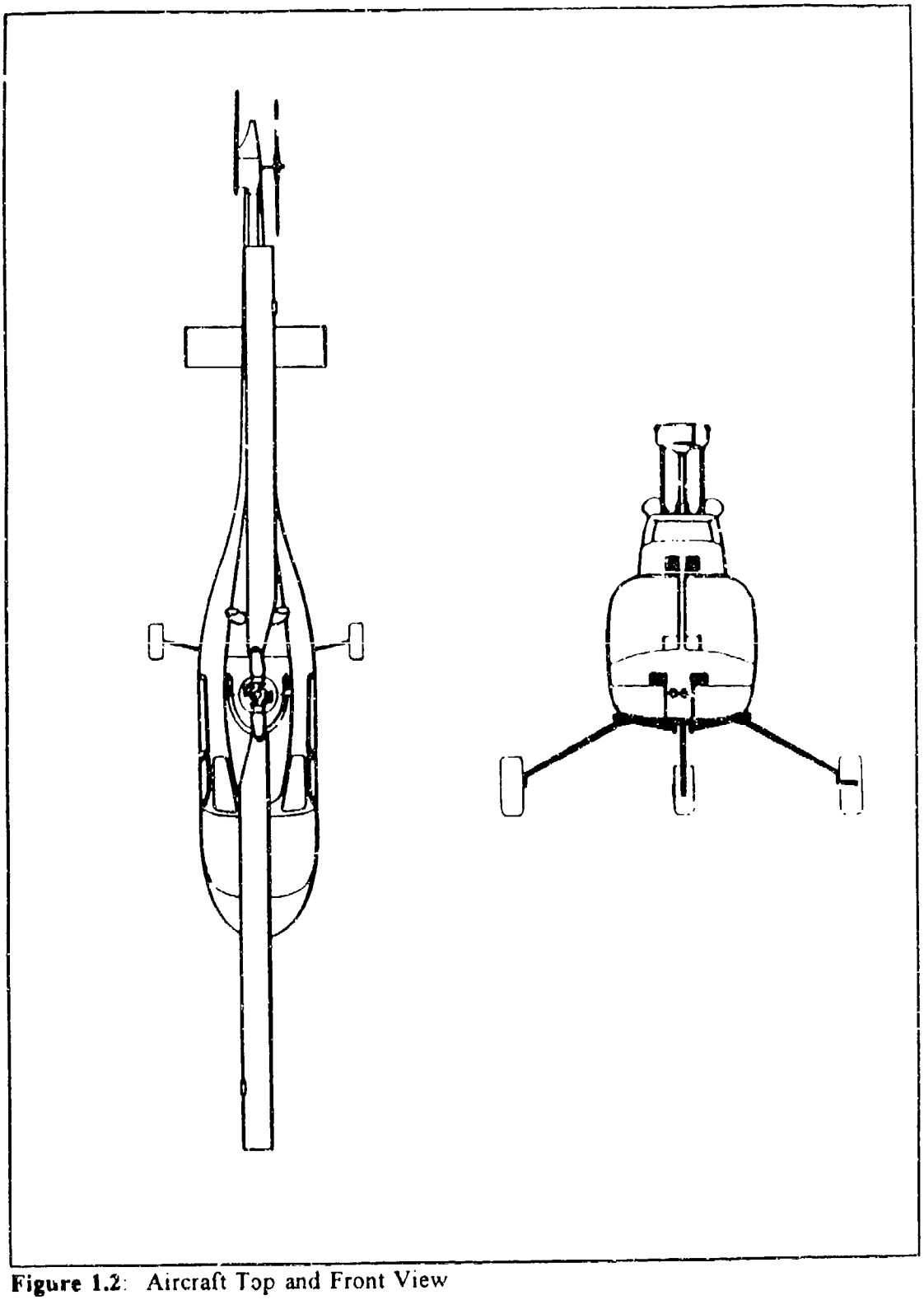


Figure 1.2: Aircraft Top and Front View

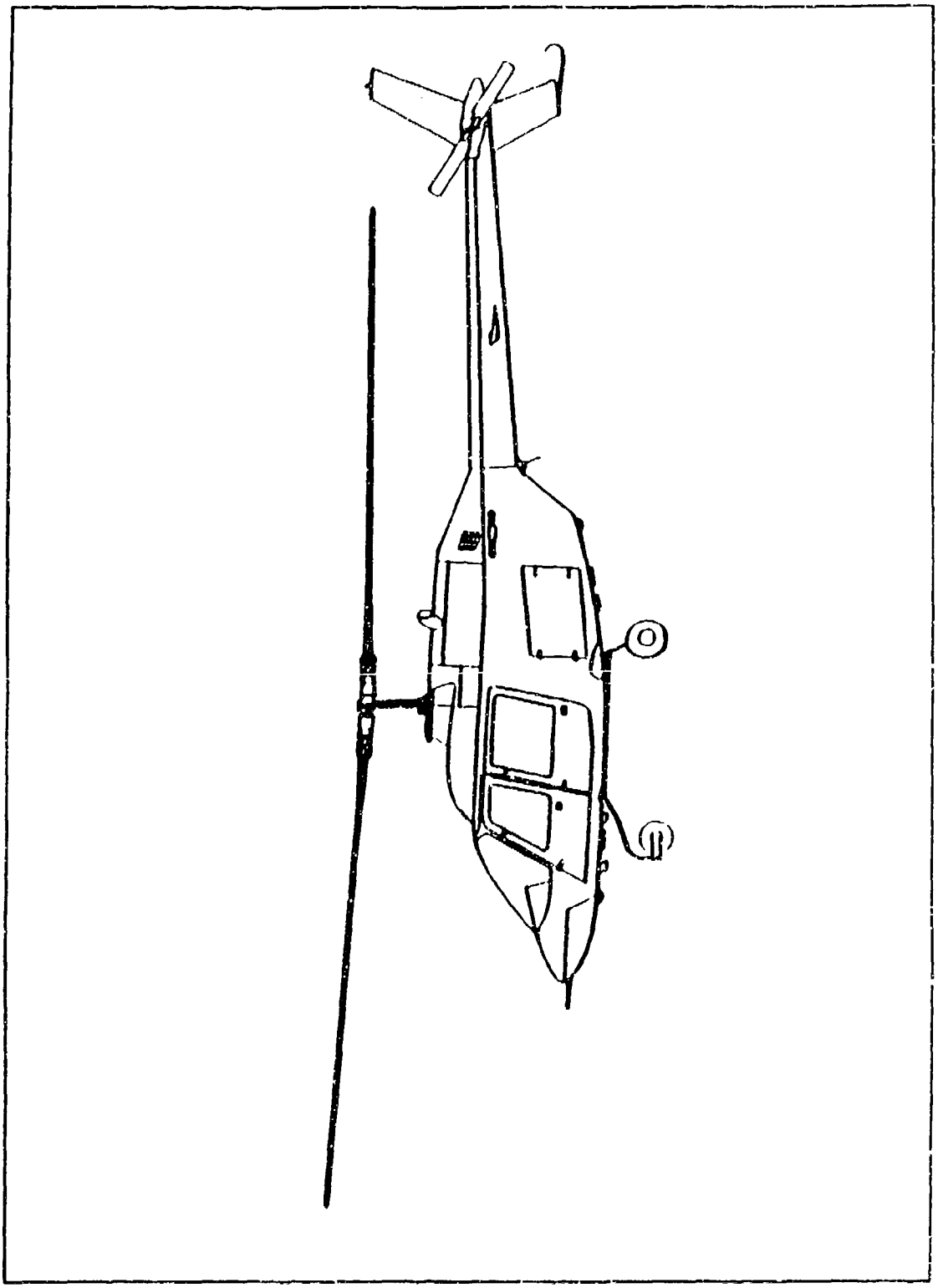


Figure 1.3: Aircraft Side View

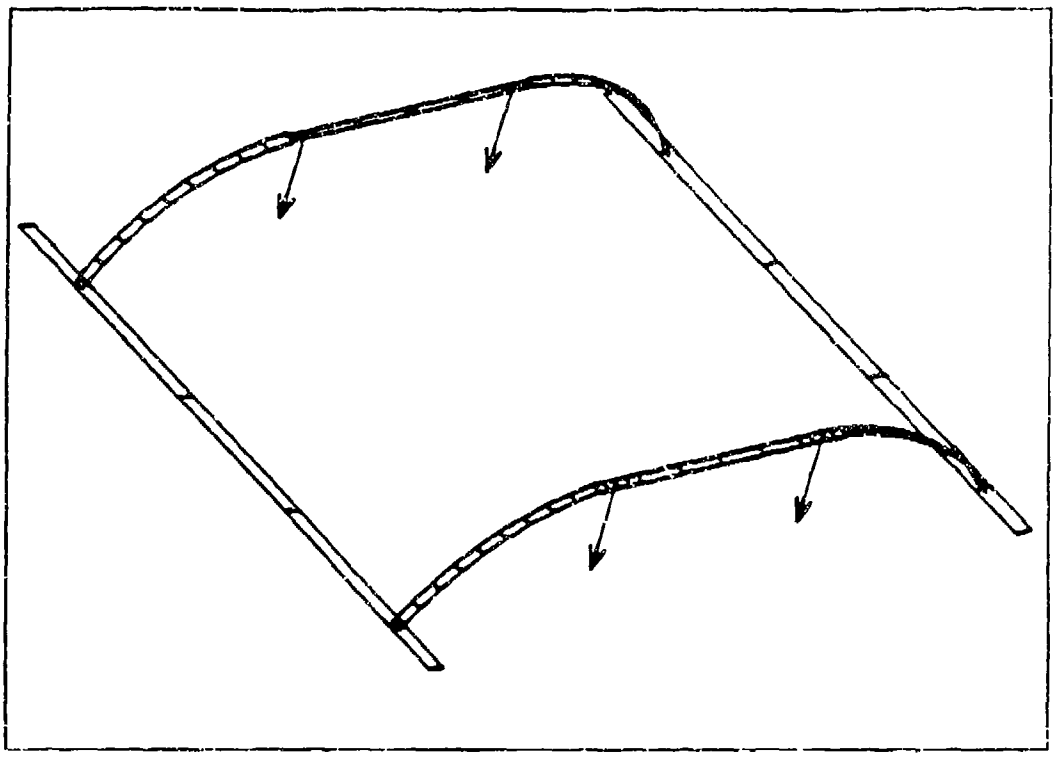


Figure 1.4: Current Skid Gear

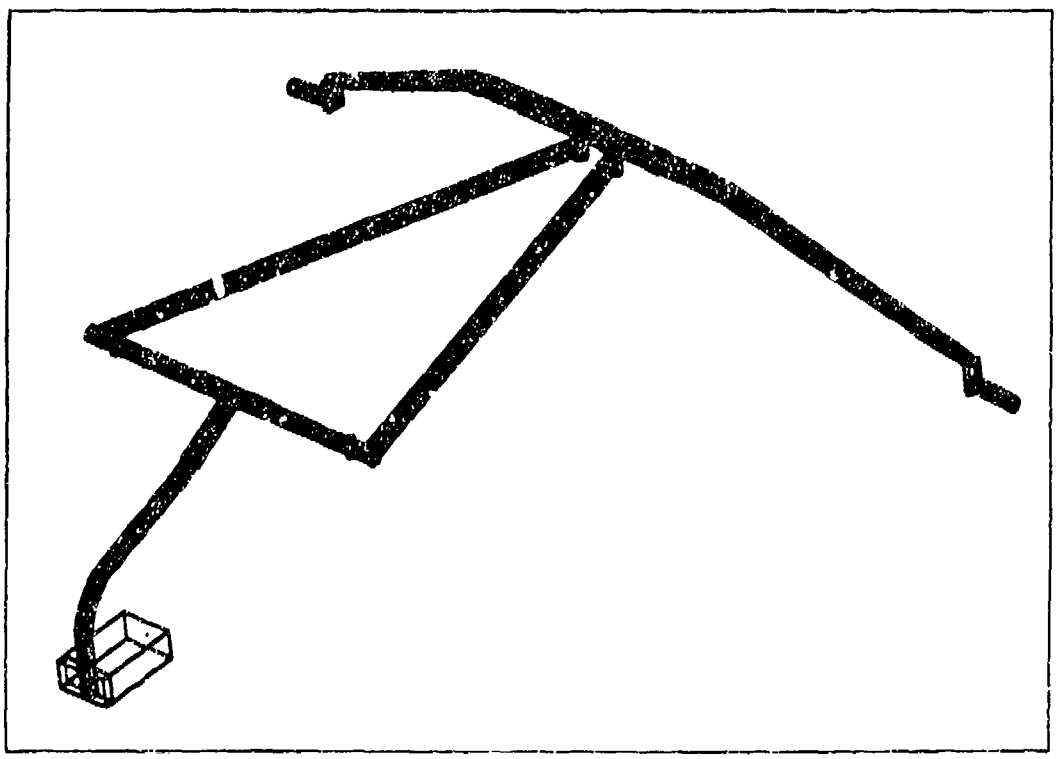


Figure 1.5: Proposed Wheeled Gear System

II. SYSTEM COMPARISON

A. COMPARISON CRITERION

The two landing systems were compared outlining advantages/disadvantages of each. Modifications are suggested for the wheeled system with the goal of improving its design. Many of the factors discussed are based on characteristics not finalized at this stage of the wheeled gear's development and are intended as a marker for further improvement or evaluation at later stages of the design.

B. PHYSICAL SYSTEM DIFFERENCES

1. Weight

The weights of the gears were computed using the MASS function in GIFTS program. Only a portion of the skid gear was available for weighing. The GIFTS calculations of the weight of this portion of the gear was compared to the experimentally derived weights The experimental and calculated weights compared to within 12%, thus validating the MASS calculations. The assumption was made that the MASS calculations were correct for the portions of the gear not available for weighing. Changes were made in the wheeled gear mass data to add the wheels, which were not modeled and lighten the nose gear fork, modeled in the computer as a solid rectangular piece. The brakes, hydraulic lines, pedal extensions and associated hardware are not accounted for in the weights.

The MASS function calculated skid gear weight as 25.5 lbs and the wheeled gear weight as 142 lbs. For the TH-57B (basic weight 1875 lbs), this weight penalty of approximately 125 lbs (excluding the brake assembly) would not be a major factor, as it increases the takeoff weight to approximately 3020 lbs. For the TH-57C (2050 lbs basic weight) this weight becomes more critical allowing a baggage payload of approximately 5 lbs. (Two pilots- 400 lbs, 91 gallons fuel - 620 lbs, standard day).

2. Effects on Center of Gravity

Again using the data from the MASS function, a spread sheet was created to compute the center of gravity. Starting with two CG locations (WL 53.5, STA 114.5 and WL 56.5, STA 105) the effect of the skid gear was subtracted and the wheeled gear added. The new CG locations were WL 51.8, STA 114.5 and WL 54.6, STA 105.4.

Longitudinally, the helicopter CG was not affected by the new gear, but vertically the wheeled gear lowered the CG by almost two inches.

3. Brakes

Brakes will contribute to the improved taxing characteristics inherent with a wheeled system. The brake system was not available for this investigation and so no further discussion will be made of the brake components.

4. Towing

The skid gear configuration requires add-on ground handling wheels and a standard towbar for ground towing. The wheeled gear system requires only the towbar

for ground towing. The gear tested was not configured for a standard tow bar, but the configuration should neither pose any problem nor require a major modification.

C. PERFORMANCE FACTORS

1. Drag

If the landing gear tubes are modeled as constant diameter cylinders, an approximation for c_D, and thus an approximate drag value, can be determined (Anderson, 1991). (The wheels of the wheeled gear are modeled as two additional cylinders and their drag added to that of the tube's drag.) Using this simplification, the drag for the wheeled gear was 11% greater than that of the skid gear. The final drag study will have to take into account the advantages and disadvantages of the proposed additions of wheel and strut farings which were not modeled in this study.

2. Static Roll Over

The static roll over angle of the skid gear equipped TH-57 is 31°. The wider footprint and lower CG of the wheeled system will increase the roll over angle to 35° at a CG of WL 54.6, STA 101. At this forward CG with the tricycle gear, a forward left or right attitude at touchdown will reduce the roll over angle to 27°; however, this is an unusual flight condition which is unlikely to be encountered. Figure 2.1 illustrates the roll over angle computation method.

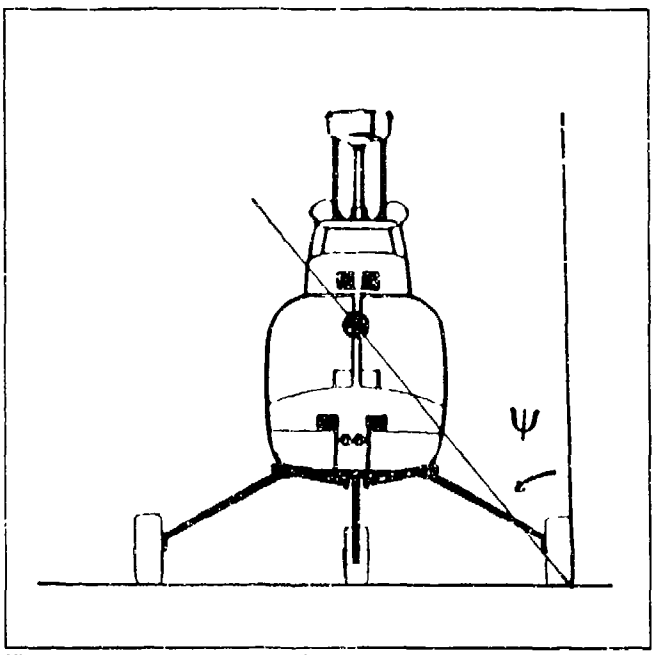


Figure 2.1 Static Roll Over Angle

3. Ground Resonance

As shown by Coleman in 1943 (Coleman, 1943), a two bladed helicopter is not susceptible to ground resonance irrespective of a skid or wheeled gear configuration.

4. Nosegear Loads

A normal force of not less than .08 times takeoff weight is required for adequate nosegear steering (Roskam, 1986). With slightly over a quarter of its weight on the nose wheel (CG aft) the steering wheeled system meets this requirement. This ratio is similar to the Navy's other tricycle geared helicopter, the H-46.

5. Shimmy

The positive trail angle of the wheeled design inherently results in reduced gear shimmy (Roskam, 1986). A complete analysis of any wheeled gear shimmies should be performed during experimental taxi tests of the aircraft mounted hardware.

6. Turn Radius

The skid gear equipped helicopter must hover to turn. As shown in Figure 2.2, the turn radius of the helicopter using the hover-to-turn technique is nine feet less than the ground turn provided with the wheeled gear system.

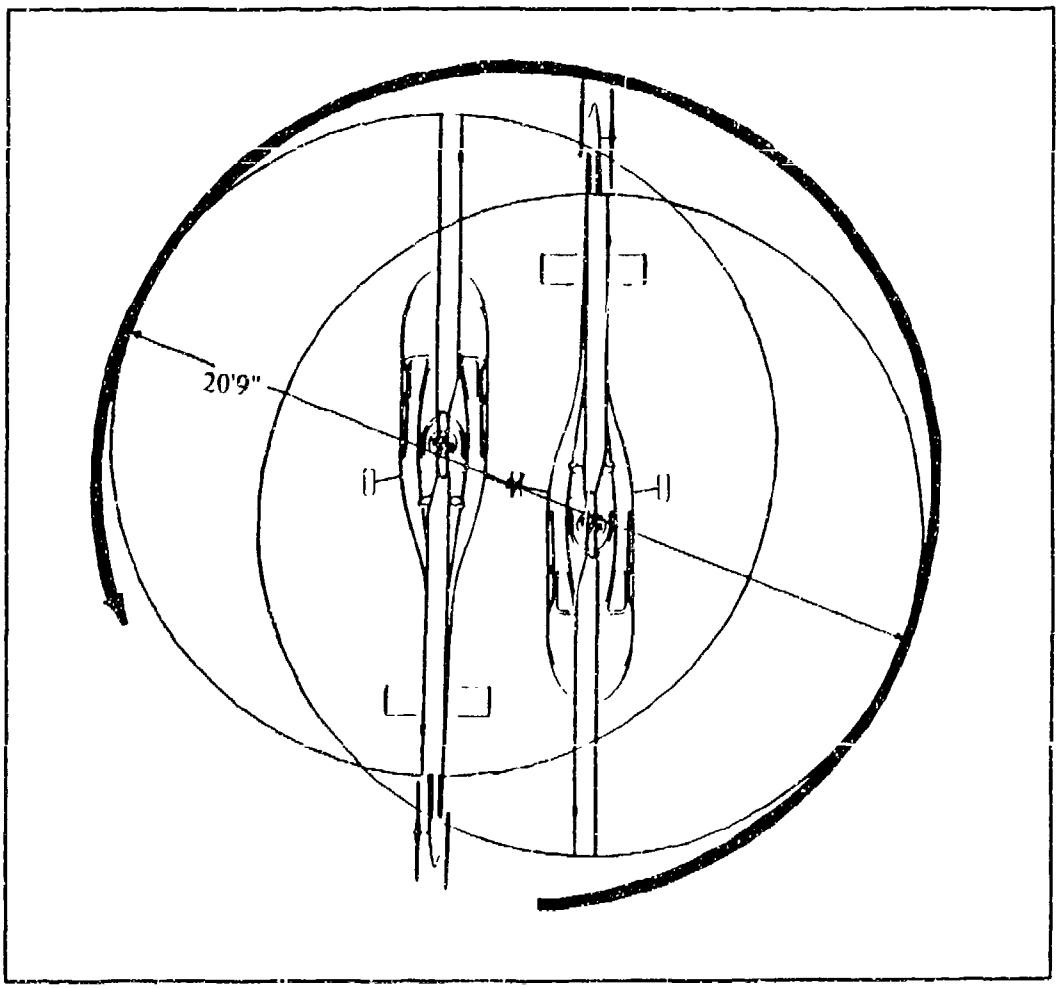


Figure 2.2: Turn Radius

III. ANALYSIS OF CURRENT GEAR SYSTEM

A. PURPOSE

The goal for this series of simulations and experiments was to generate and validate the use of a finite element model (using the GIFTS program) for the skid landing gear system. The results from Bell Helicopter's experimental testing of each crosstube of the TH-57 gear was obtained and compared with the deflections computed for the same loading conditions simulated in the GIFTS model.

B. GIFTS PROGRAM RESULTS

The GIFTS program is a versatile tool for use in a variety of structural applications including; animation, model generation, frequency response static analysis, steady state harmonic response and thermal stress analysis. GIFTS consists of different specialized modules, or processors, that run independently of one another. The BEAMCS module, for instance, generates the cross sections of elements that later in the BULKM module are given length, position in space and material properties. The model generation files used in this study, which may be identified by the *.SRC file name extension, are contained in Appendices A and B.

1. Model Generation

Appendix A contains the ASCII input data files for the GIFTS model generation of the individual crosstubes. Each crosstube was positioned so that

assembling a complete landing gear could be accomplished with the addition of the skid tubes. The model dimensions are those of the skid gear used on the TH-57, OH-58A and the civilian 206A-1. The crosstubes are made of AL7075-T6. The material properties were taken from the Alloy Digest (Alloy, 1973). Poisson's Ratio was computed from the given values of Modulus of Elasticity, E, and Modulus of Rigidity, G, using the formula:

$$G = \frac{E}{2(1+\nu)}$$

2. Program Results

Appendix D contains the program output from the GIFTS model. There are two pages devoted to each loading condition in identical formats. Tables D*-1 give the loads applied to the model. Tables D*-2 give the principal stresses for each element. Tables D*-3 are the deflections of each point shown in Figures D*-1. Bell Helicopter's data contained only the deflection of the center points, point 56 on the forward crosstube and point 51 on the aft crosstube. Figures D*-2 are the deflected crosstube and Figures D*-3 are the crosstube with the magnitude and deflection given by arrows.

Figures 3.1 and 3.2 compare the deflections of point 56 for the forward crosstube and point 51 for the aft crosstube respectively versus the values obtained by Bell Helicopter. As shown, there was excellent agreement up to a load of 1550 lbs per mount point or 3100 lbs per crosstube. At this point the principal stresses

exceeded the yield stress of the material, requiring nonlinear analysis, which was not performed in this thesis.

3. Conclusions

The GIFTS simulation results compared favorably with the Bell Helicopter experimental data through the region of linear behavior. Fidelity is lost only after reaching the yield stress of the material.

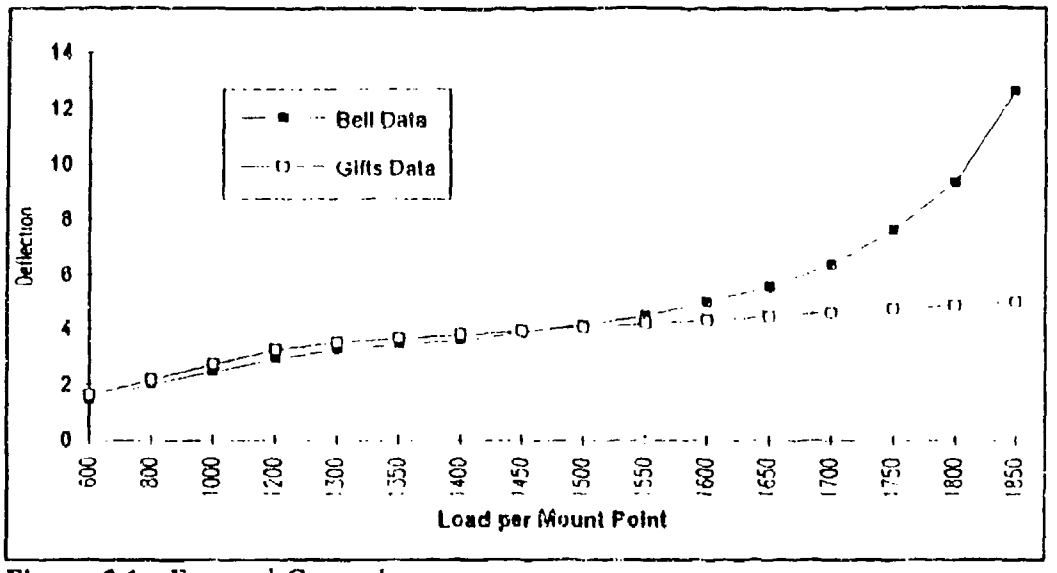


Figure 3.1: Forward Crosstube

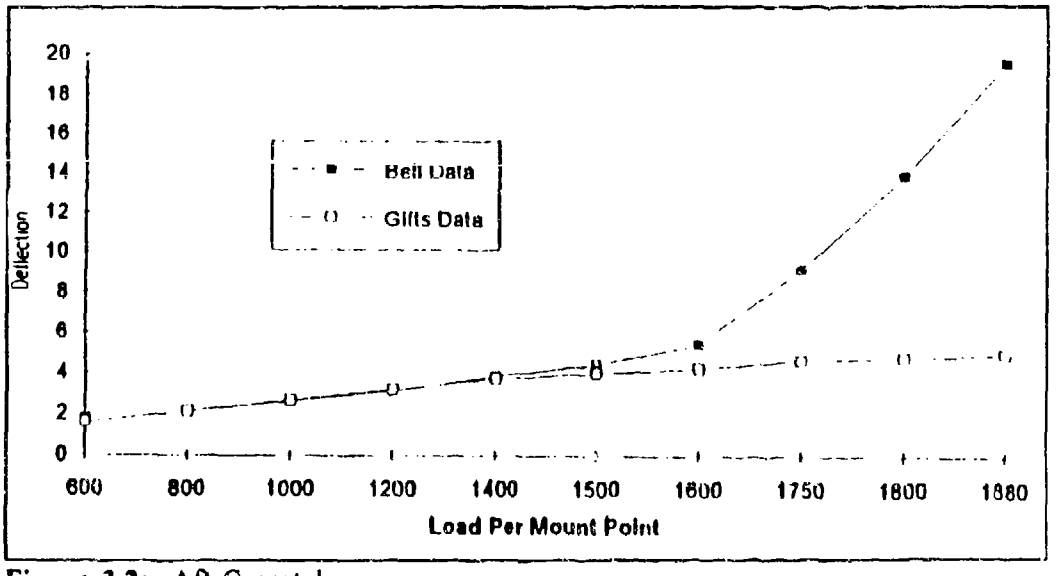


Figure 3.2: Aft Crosstube

IV. COMPUTER MODELING OF WHEELED GEAR SYSTEM

A. PURPOSE

The GIFTS computer model was used to duplicate the experimental loading test conditions used for the wheeled gear system. The model calculations were then compared to the experimental data. The intent was to use the experimental data to validate the computer simulation to the practical limits of testing for the single test structure (failure) and the limited experimental apparatus.

B. MODEL

Appendix B contains the ASCII input data files for the wheeled gear system model.

1. Nomenclature and Element Location

Figures 4.1 to 4.12 show the gear nomenclature and element location.

Figure 4.1 is a view of the entire gear without the tires. The right and left sides of the gear are those that would be on the right and left of a person sitting in the pilot's seat. From the lower left of the figure, the solid two piece rectangle is the modeled nose wheel fork which is also pictured in Figure 4.2. The tube going from the nose wheel fork up is referred to as the nose wheel attachment tube, and is also shown in Figure 4.3. Joining the nose wheel attachment tube to the torque tube is the T bracket, best seen in Figure 4.4. Extending back from the torque tube are the two

longitudinal tubes, enlarged in Figures 4.3 and 4.5. The longitudinal tubes are secured to the cross tube by the longitudinal attachment bolts, appearing again in Figure 4.6. Extending from these junctions, duplicated in Figures 4.7, and 4.8 are the gear legs, expanded in Figures 4.9 and 4.10, which end with the axles.

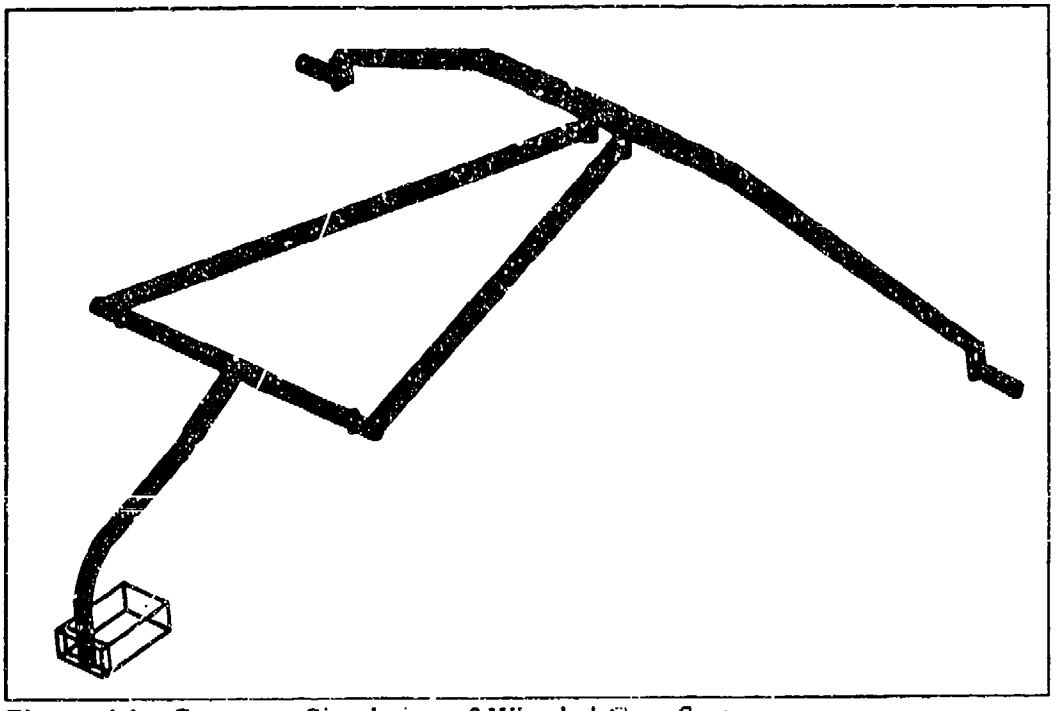


Figure 4.1: Computer Simulation of Wheeled Gear System

Figure 4.2 illustrates how elements 96 and 95 extend into the junction of element 130 and 131 making up the nose wheel fork. From Figure 4.4 the T bracket can be better visualized. Element 102 is the upper end of the nose wheel attachment tube, while element 103 is the base of the T bracket. Elements 105 and 104 make up the right and left sides respectively of the T bracket, where elements 115 to 120 are the portions of the torque tube sleeved inside the T bracket

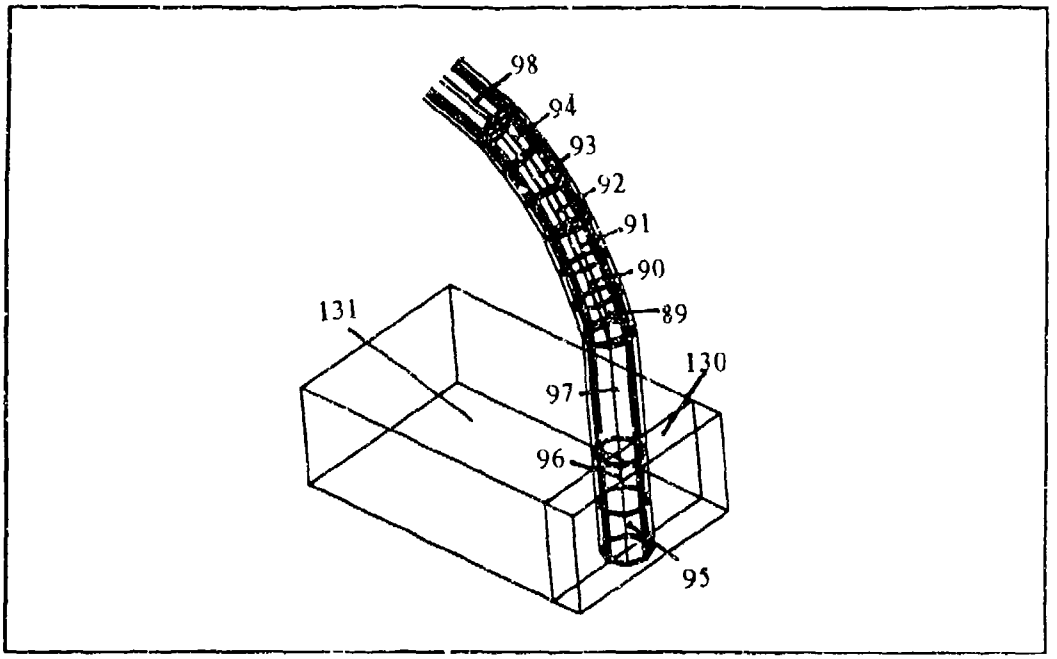


Figure 4.2: Nose Wheel Fork and Nose Wheel Attachment Tube

Figures 4.3 and 4.5 are the left and right longitudinal tubes respectively.

Figure 4.6 is the center portion of the aft gear. Elements 157 to 159 and 154 to 156 make up the right and left longitudinal bolts respectively. Elements 141 and 132 are the last elements of the longitudinal tubes. Elements 85 to 88 are the solid joining rod inside the cross tube held in place by the hollow ends of the gear legs. Elements 70 to 77 form the center portion of the cross tube, while elements 53 and 54 are the last elements of the right gear leg. Elements 55 and 56 are the mirror images of elements 53 and 54 for the left gear leg.

Figure 4.7 is the horizontal portion of the right gear leg. Elements 63 to 70 are the right end of the cross tube while the remainder of the elements pictured form the gear leg. The same structure is evident in Figure 4.8 where elements 77 to

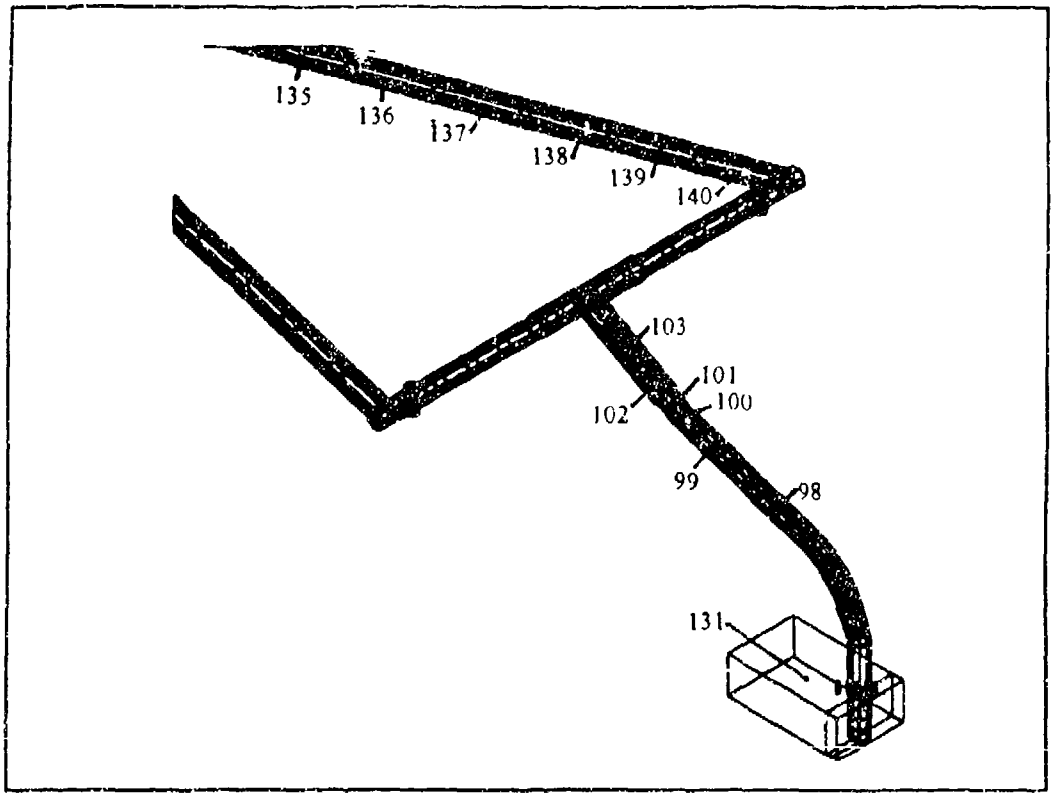


Figure 4.3: Forward Portion of Gear

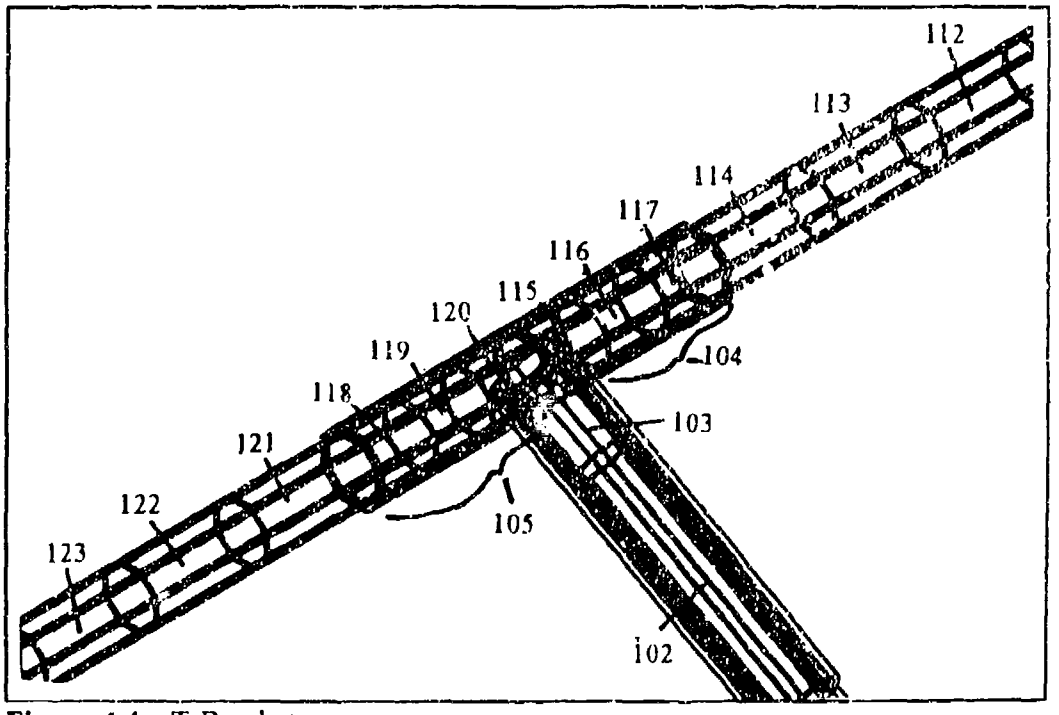


Figure 4.4: T Bracket

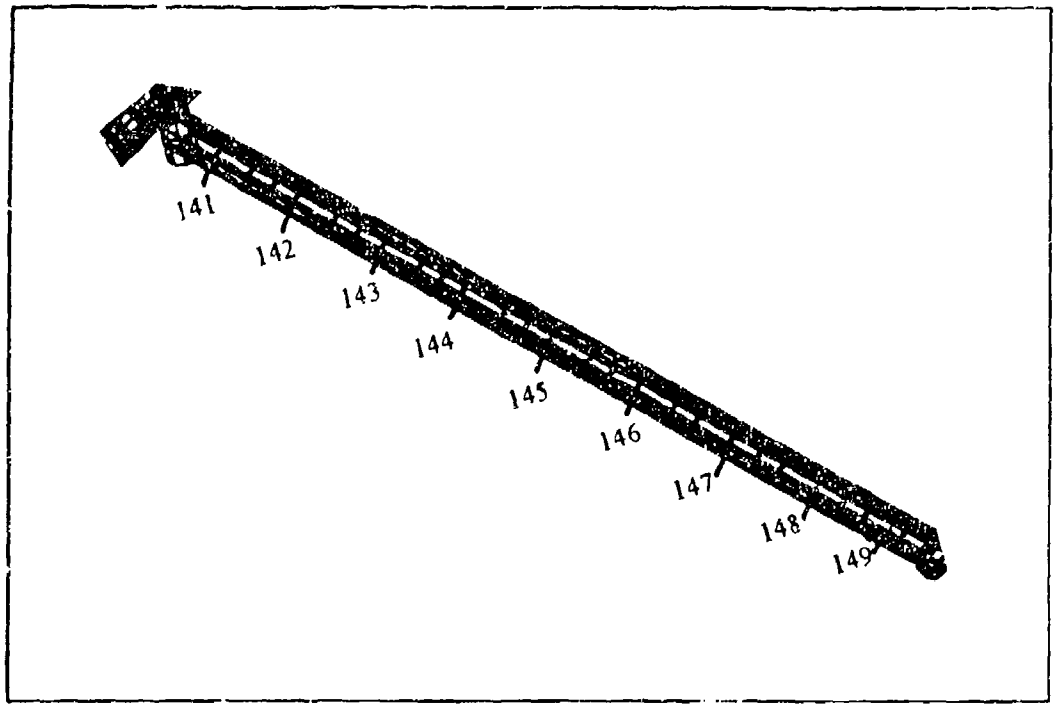


Figure 4.5: Right Longitudinal Tube

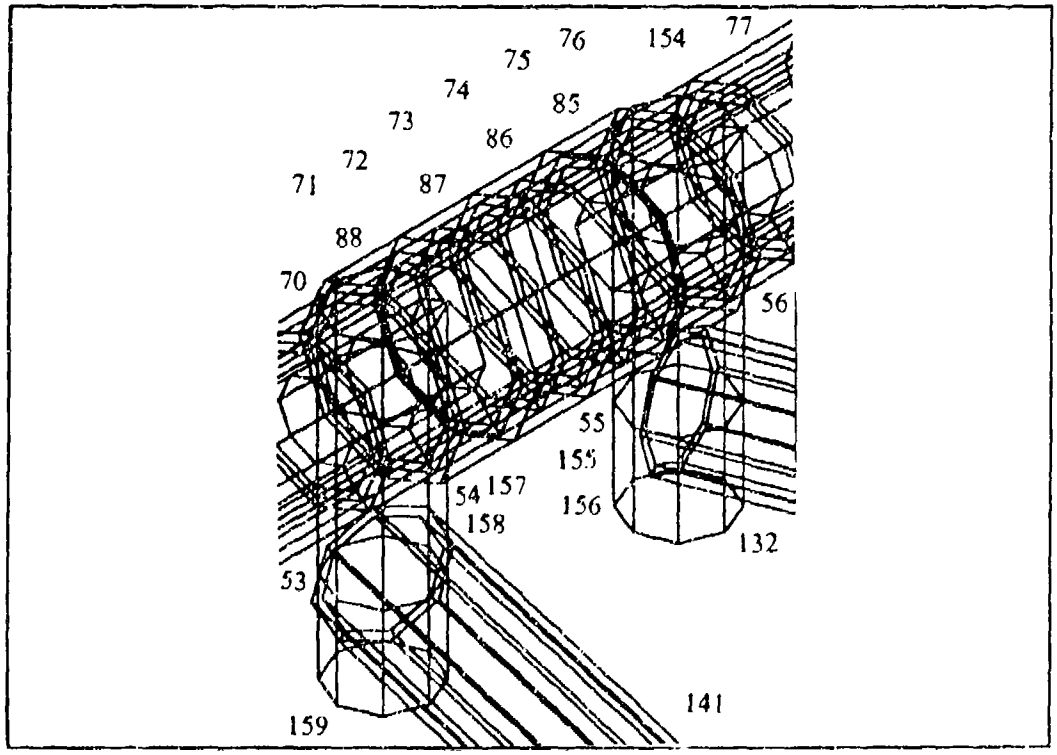


Figure 4.6: Center Aft Crosstube

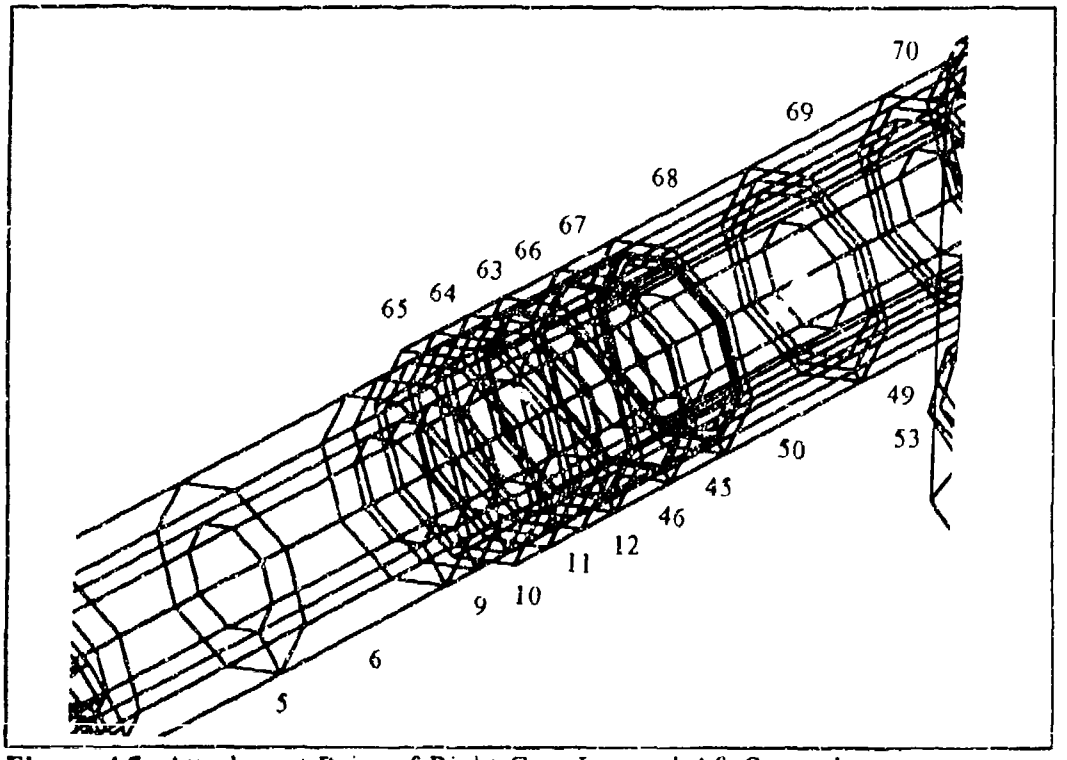


Figure 4.7: Attachment Point of Right Gear Leg and Aft Crosstube

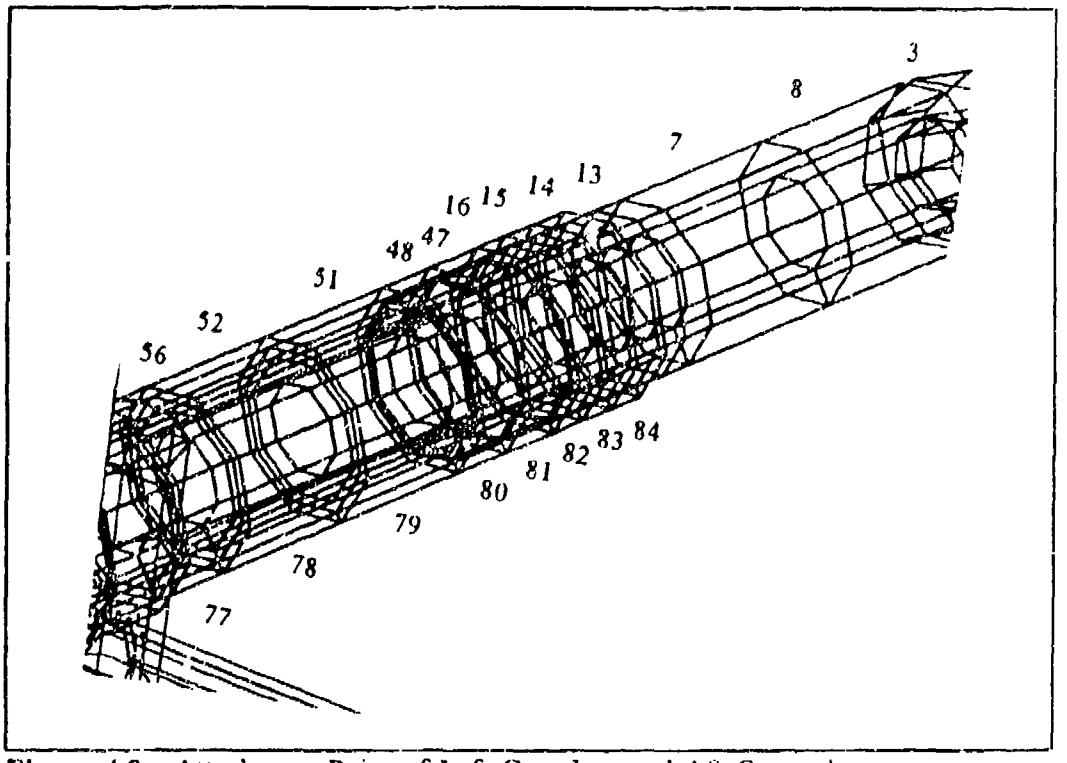


Figure 4.8: Attachment Point of Left Gear Leg and Aft Crosstube

84 are located on the left portion of the cross tube and the balance are on the left gear leg. Figures 4.9 and 4.10 show the right and left gear legs and axles respectively.

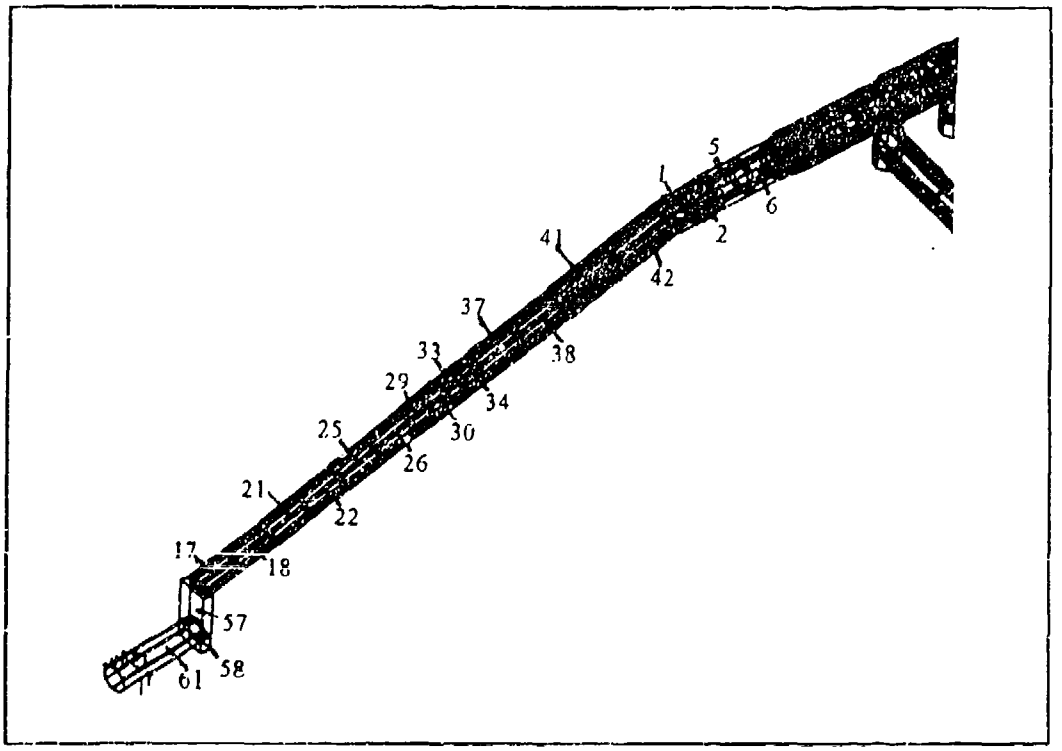


Figure 4.9: Right Gear Leg

Figures 4.11 and 4.12 are the right and left joints of the forward end of the longitudinal tubes with the torque tube. Elements 152, 153 and 150, 151 make up the bolts securing the longitudinal and torque tube together. These joints are modeled as the intersection of two tubes rather than the gear's bent longitudinal tube sleeving over the outer ends of the torque tube.

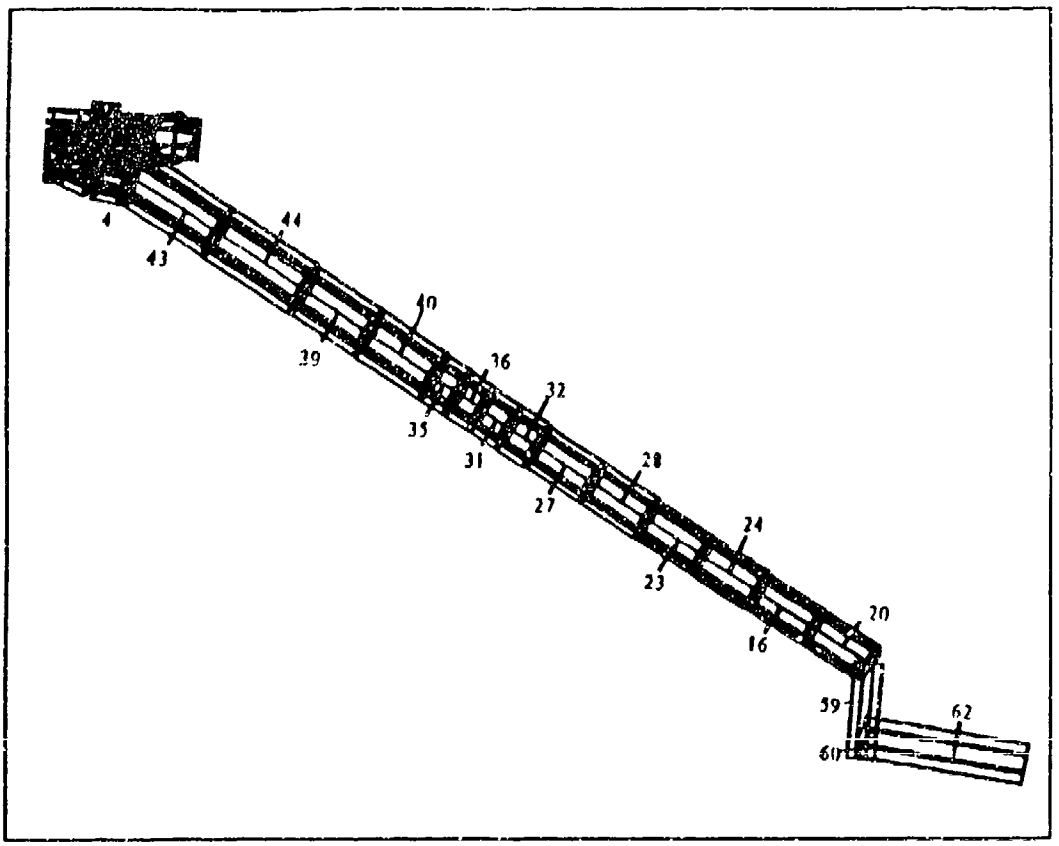


Figure 4.10: Left Gear Leg

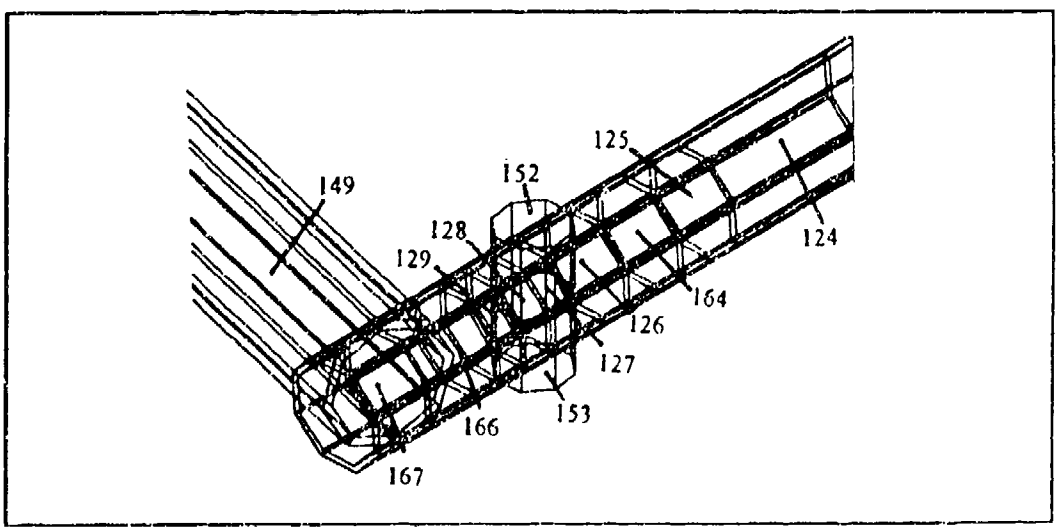


Figure 4.11: Attachment Point of Right Longitudinal Tube and Torque Tube

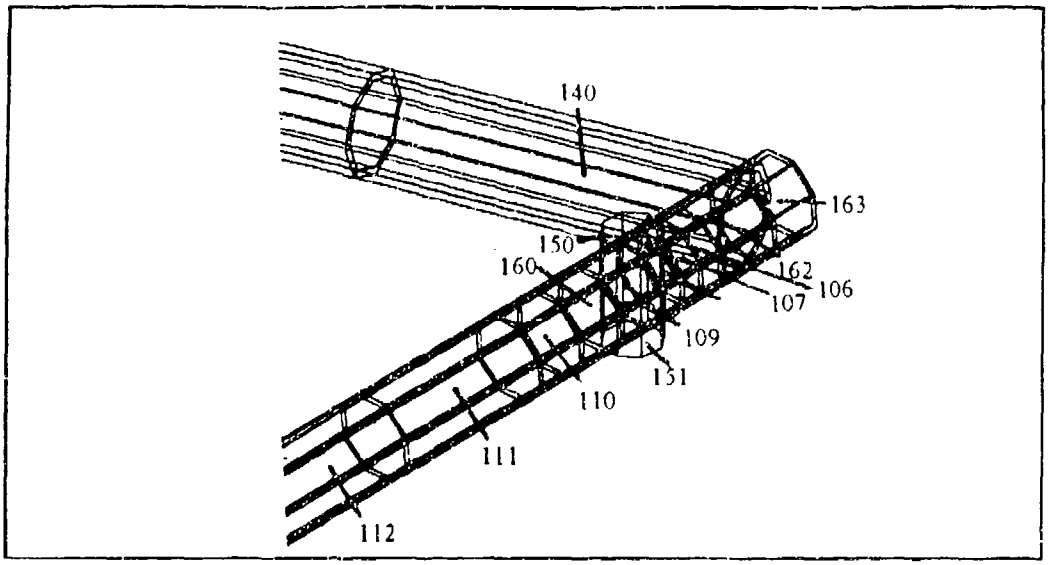


Figure 4.12: Attachment Point of Left Longitudinal Tube and Torque Tube

2. Model Assumptions and Differences

A number of simplifying assumptions were required by the GIFTS model. The assumptions included.

- The welds on the forward portion of the longitudinal tubes were not modeled. As an approximation, the intersection of two tubes was used.
- The nose wheel fork was modeled as a solid rectangular piece of 4130 Steel (Alloy Digest, 1988). Deflections in this piece were unlikely to occur prior to plastic deformation of outer portions of the structure and thus this simplification was acceptable.
- The solid plugs in the center of the aft portion of the longitudinal tubes, through which the bolts run were not included in the computer model.
- The spacers on the aft bolts were excluded from the model
- The tires were omitted from both the computer model and the experimental wheeled gear test apparatus.
- The axles were modeled as rectangular and circular segments and did not include the attachment hardware.

- The tapering of the gear leg was modeled as seven constant diameter sections. Each section's diameter was different from the next, approximating a tapered tube.

- The simulated loads were applied directly at the helicopter attachment points. In the test structure, the loads were applied at a box beam structure which in turn transmits the loads to the wheeled gear via the gear attachment points.

- All sleeved components were modeled as fixed point loads and were thus not allowed to move in relation to each other. This assumption was acceptable because under the loading conditions tested, the bolts used in the gears assembly similarly limited movement.

- Compound curves, (one curve in each gear leg and two in the nose wheel attachment tube), were modeled as simple quadratic.

- The gussets on the attachment tube between the torque tube and the nose wheel attachment tube were not modeled.

- All bolts were modeled assuming 6150 steel (Alloy Digest, 1955) rather than the Grade 8 steel used in the gear construction.

C. LANDING TEST RESULTS

In accordance with the test plan in Appendix C, landing simulations were conducted using the GIFTS software. The data was grouped by aircraft CG location, with each run increasing the weight from the previous run until the structure was loaded to aircraft maximum gross weight and are contained in Appendix F. Included in each data set was the load placed at each mount point, the displacement of points 31 and 110 and the normal and shear stresses at the seven locations corresponding to the strain gage locations on the actual gear.

The experimentally derived wheeled landing gear results will be discussed in Chapter VI.

Where the GIFTS tests were not duplicated with experimental data, a survey of the failure points was conducted. This information was valuable because it would contribute to inspection criteria of the gear after a hard landing. Knowledge of the critical portion of the gear, where failure may occur when the aircraft was subject to a hard landing, allows for appropriate inspections of the gear and warning of the need to replace if warranted.

1. Different Center of Gravity Locations

Five different center of gravity locations were chosen for GIFTS software simulations. The centerline center of gravity was located along the centerline of the aircraft laterally and was midway between the fore and aft longitudinal CG limits, at STA 110. The other four were located four inches beyond the lateral and longitudinal limits. Aft, right refers to the CG location of STA 118, LAT -7, aft, left was located at STA 118, LAT 8, forward right was placed at STA 101.5, LAT -7 and forward left was situated at STA 101.5, LAT 8. Figure 4.13 presents the test CG locations. Figures 4.14 and 4.15 show the CG limits of the TH-57 B/C.

Four inches outside the limits shown in Figures 4.14 and 4.15 was chosen as an extreme condition based on the fact that if the helicopter was flown in any of these conditions, the control authority of the aircraft would be insufficient to compensate and all landing loads normally experienced would be less than tested here.

The gear was modeled without the tires to keep the computer simulations similar to the configuration of the experimental gear apparatus.

The data from these tests appears in Appendix E.

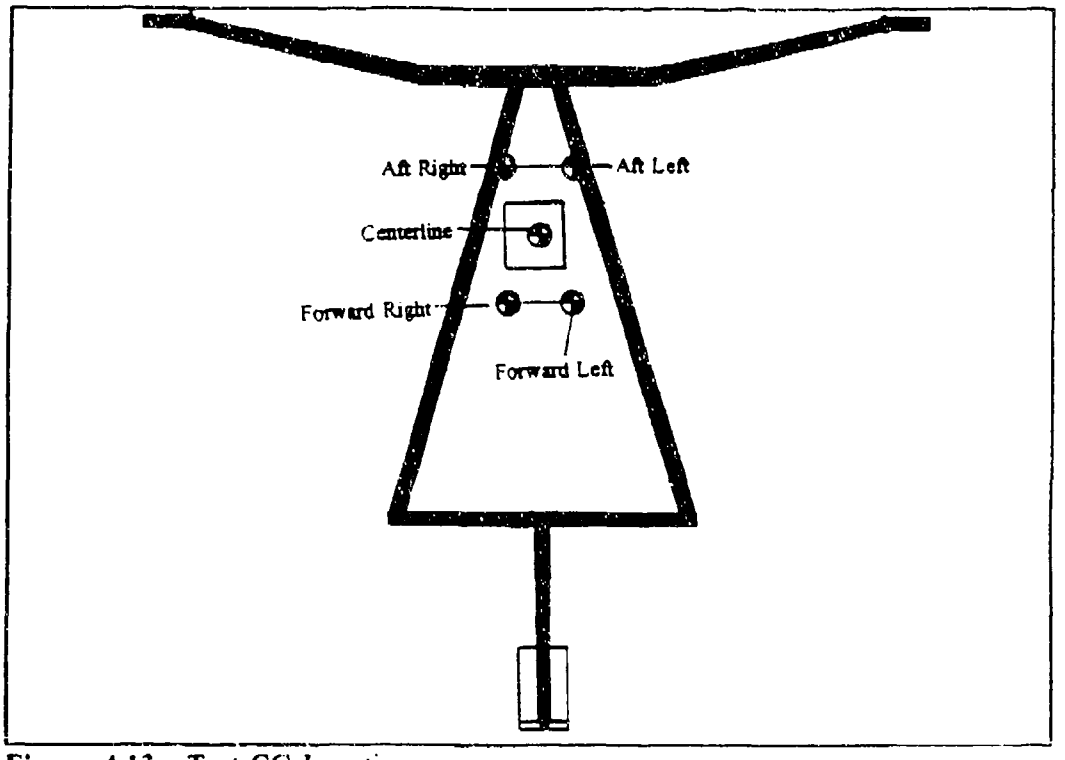


Figure 4.13: Test CG Locations

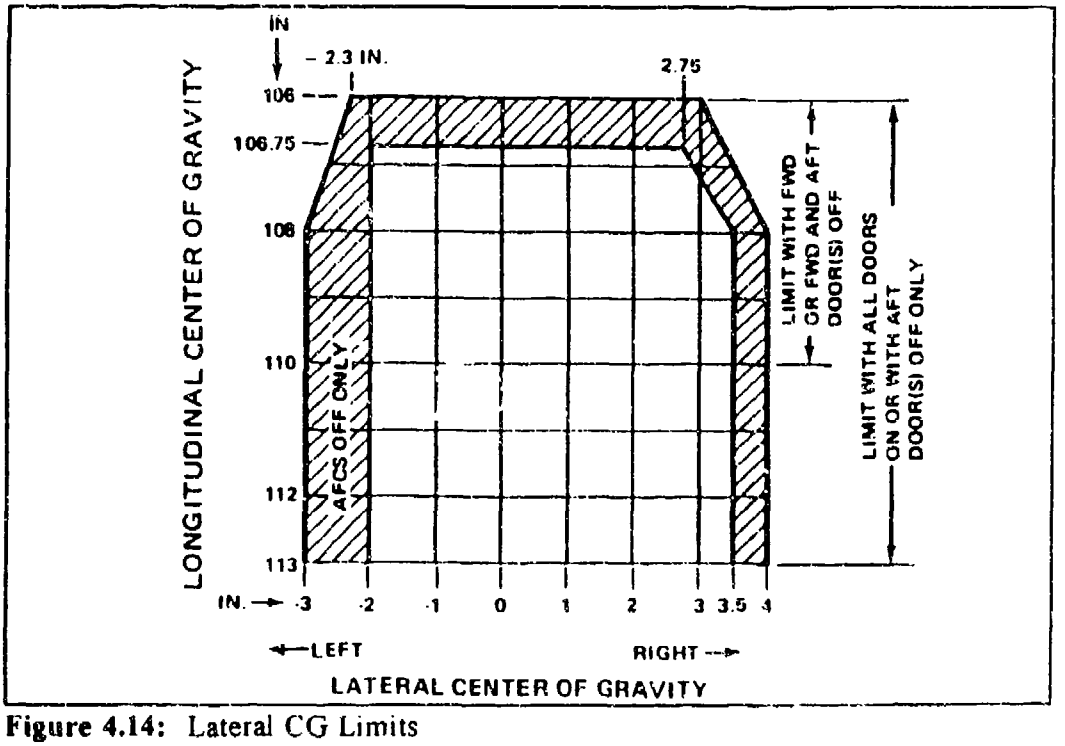


Figure 4.14: Lateral CG Limits

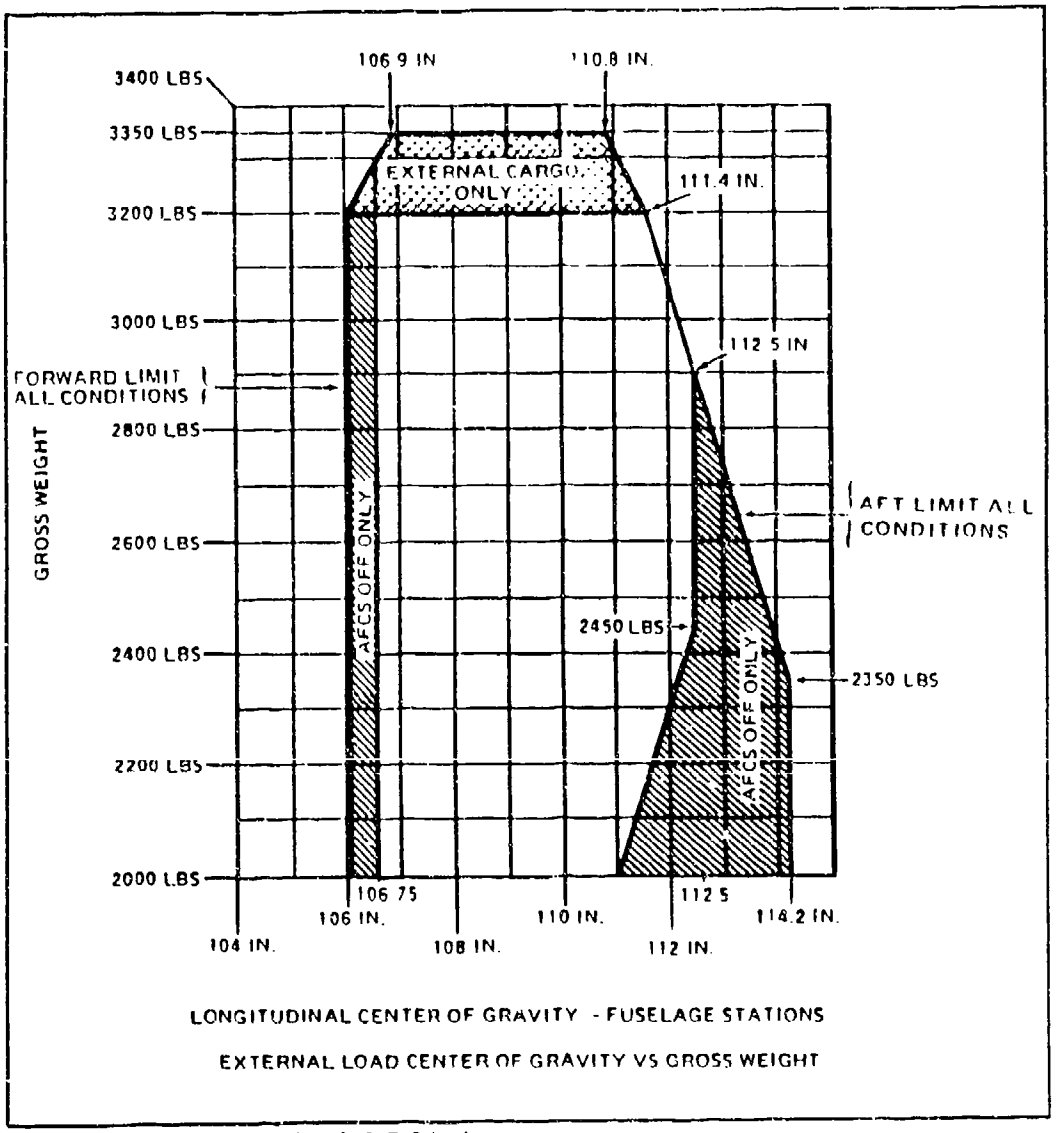


Figure 4.15: Longitudinal CG Limits

2. Single Point Landing

In this series of GIFTS simulations a load of 3200 lbs was placed at one mount point while the other three remained at zero. The intention was to simulate conditions associated with a single point landing.

Since this test was not duplicated experimentally on the physical gear, of interest here were the computer predicted locations of stresses exceeding those of the Von Mises yield stress.

Only one element, number 103 shown in Figure 4.3 reached 100% of yield stress in every CG location except the aft left one. This was validated experimentally when the gear failed at element 103 while testing the forward right CG location.

3. Landing with Obstacles

This test also was not experimentally duplicated and so the results presented here will also emphasize the predicted locations of failure. The aft right CG location at 3gs was investigated. Four configurations were modeled:

- Nose Wheel Fork Elevated
- One Axle Elevated
- Both Axles Elevated
- Nose Wheel Fork and One Axle Elevated

An elevation of 7.5 inches was used because at this height the raising of one axle would move the CG outside the lateral CG limits and the static roll over angle of the helicopter would be reached.

In all four configurations, element 103 was the first to fail and occurred when the helicopter weighed approximately 3600 lbs. The result led to the conclusion that a moderately hard landing with a wheel suspended on an object or lowered into a

depression would cause a bending of the nose wheel attachment tube and the possibility of the main rotor tip path plane striking the ground.

Elements 18 and 19, near the outer end of the gear legs, were the next ones to fail in all four cases. Since this did not occur until the helicopter was subject to a 2g landing, the effect of their failure would be secondary and unlikely to be a primary cause of collateral damage.

D. TOWING

No comparable experimental towing test was conducted on the actual gear. Of primary interest for the GIFTS tests were the stresses the gear would be subject to if towing was attempted with the brakes locked. The first concern was, whether any element experienced stresses exceeding the yield stress and second, the magnitude of deflections.

For the GIFTS test, the model was loaded to the maximum gross weight at the centerline CG and a force of 1470 lbs was applied to the nose wheel fork. A force of 1470 lbs was derived using a coefficient of friction, μ, of .6 corresponding to that of locked brakes on concrete and a μ of .05 for the nose wheel, which does not have brakes (Nicolai, 1954). The calculations appear in Appendix C, the test plan.

Table 4.1 contains typical results from element 103, the only element predicted to exceed yield strength. X/L PT is the X distance divided by the length, L, of the element thus an X/L of 0.0 is the beginning of the element. Stringer locations start at

the top of the element and are numbered counter clockwise. The % yield stress column is the percent yield stress computed by the von Mises method.

TABLE 4.1 VON MISES FAILURE CRITERION

X/L PT.	STRINGER	%YIELD STRESS	X/L PT.	STRINGER	%YIELD STRESS
0.00	1	8.12%	0.50	5	8.12%
0.00	2	89.63%	0.50	6	110.25%
0.00	3	127.05%	0.50	7	155.15%
0.00	4	89.63%	0.50	8	110.25%
0.00	5	8.12%	1.00	1	8.12%
0.00	6	92.28%	1.00	2	125.56%
0.00	7	129.71%	1.00	3	177.94%
0.00	8	92.28%	1.00	4	125.56%
0.50	1	8.12%	1.00	5	8.12%
0.50	2	107.59%	1.00	6	128.22%
0.50	3	152.49%	1.00	7	180.60%
0.50	4	107.59%	1.00	8	128.22%

Figure 4.16 shows the deflection of the gear as a solid line, with the dotted line indicating the undeflected condition. The nose wheel fork was predicted to experience the greatest displacement of 4 inches forward, while the rear gear legs dropped by 2 inches. The torque tube was predicted to be 2.3 inches lower. The axles were spread out by one inch.

V. STATIC TESTS OF WHEELED GEAR SYSTEM

A. PURPOSE

Static testing was performed on the wheeled gear system to validate GIFTS results so additional testing could be accomplished by simulation with a degree of confidence.

B. THE TEST RIG

The gear was assembled (without tires) and placed on stacked I beams. A box beam structure, weighing approximately 150 lbs, shown in Figure 5.1, was placed on top of the gear. The box beam was equipped with four TH-57 landing gear mounting brackets for attachment to the landing gear At each of the box beam's four corners, was an eyebolt and from which was hung a series of shackles, a turnbuckle and a load cell (Dillon Dynamometer). Each set weighed from 12 to 15 lbs. The load cell was in turn mounted to the floor. Tightening of the four turnbuckles produced a downward load on the box beam structure thereby loading the gear to the desired weight and CG location. The test rig is shown in Figures 5.2 and 5.3. Figure 5.4 depicts the elements where the strain gages were located.

C. GEAR MODIFICATIONS

The wheeled gear configuration tested here was the third design. The first design tested had 14.5 inches, vice the 4.5 currently, between the rear longitudinal

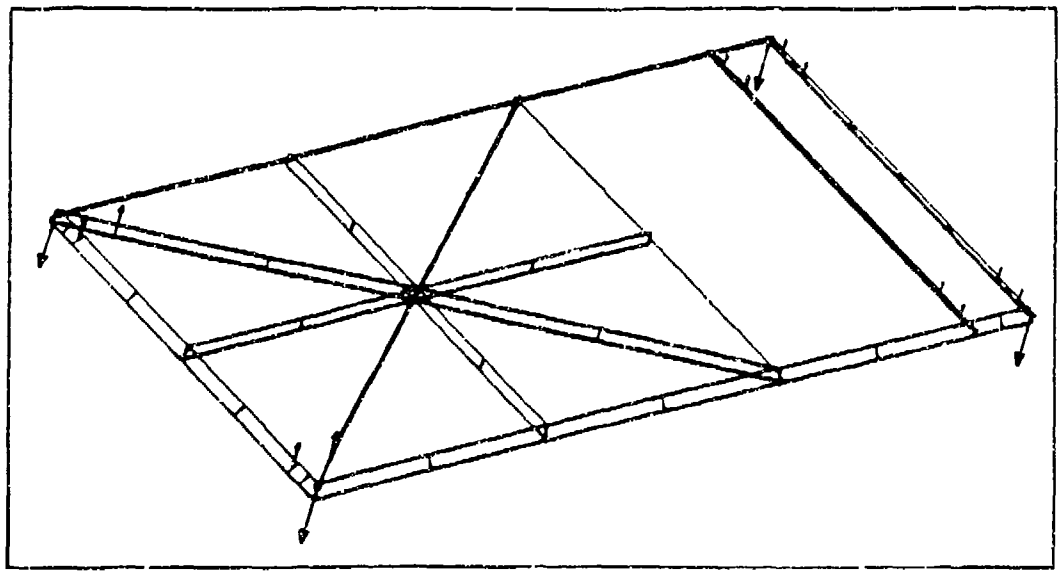


Figure 5.1: Box Beam Load Applying Structure

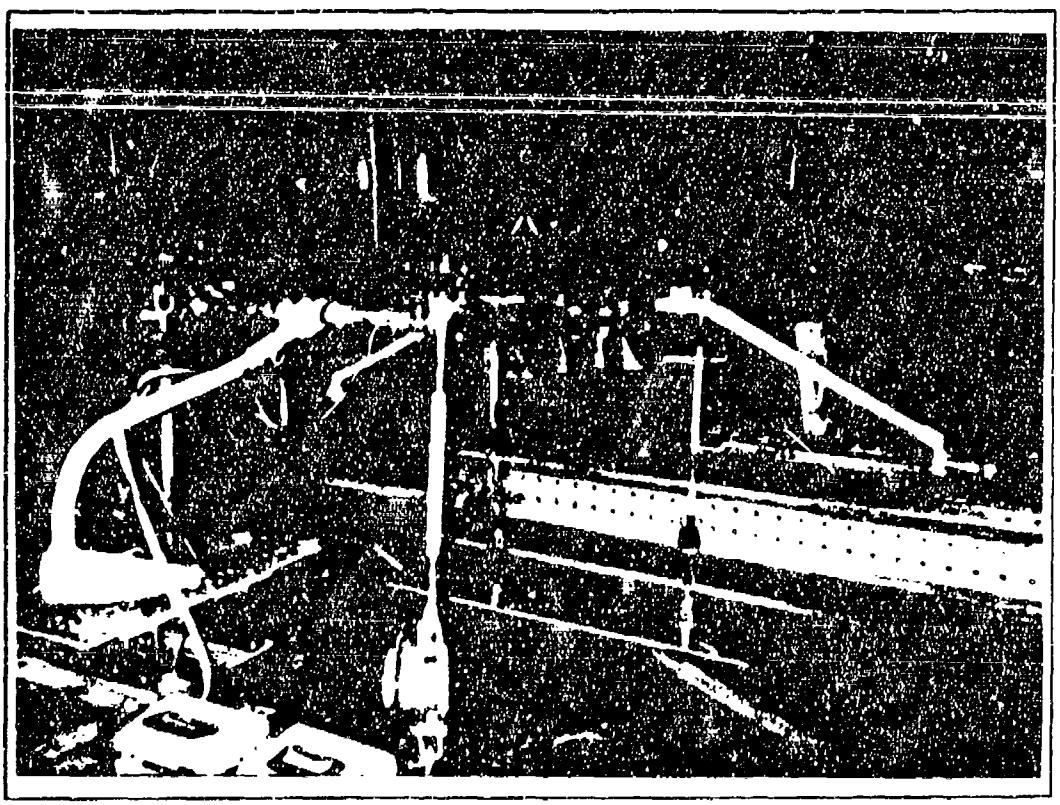


Figure 5.2: Test Rig Front View

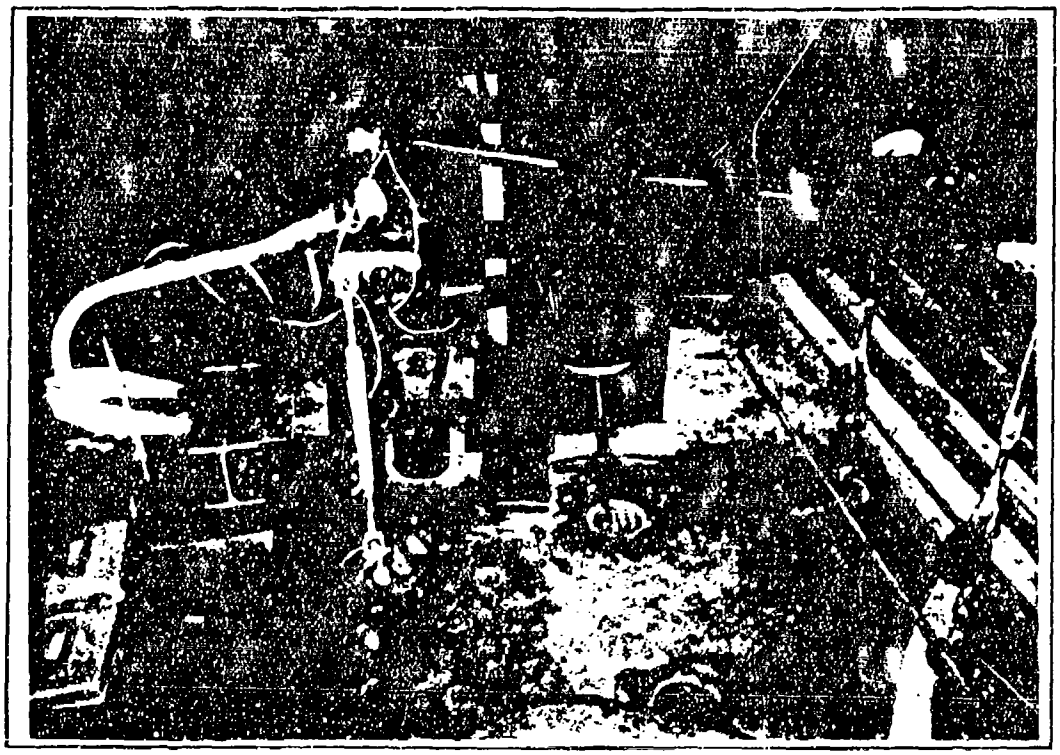


Figure 5.3: Test Rig Side View

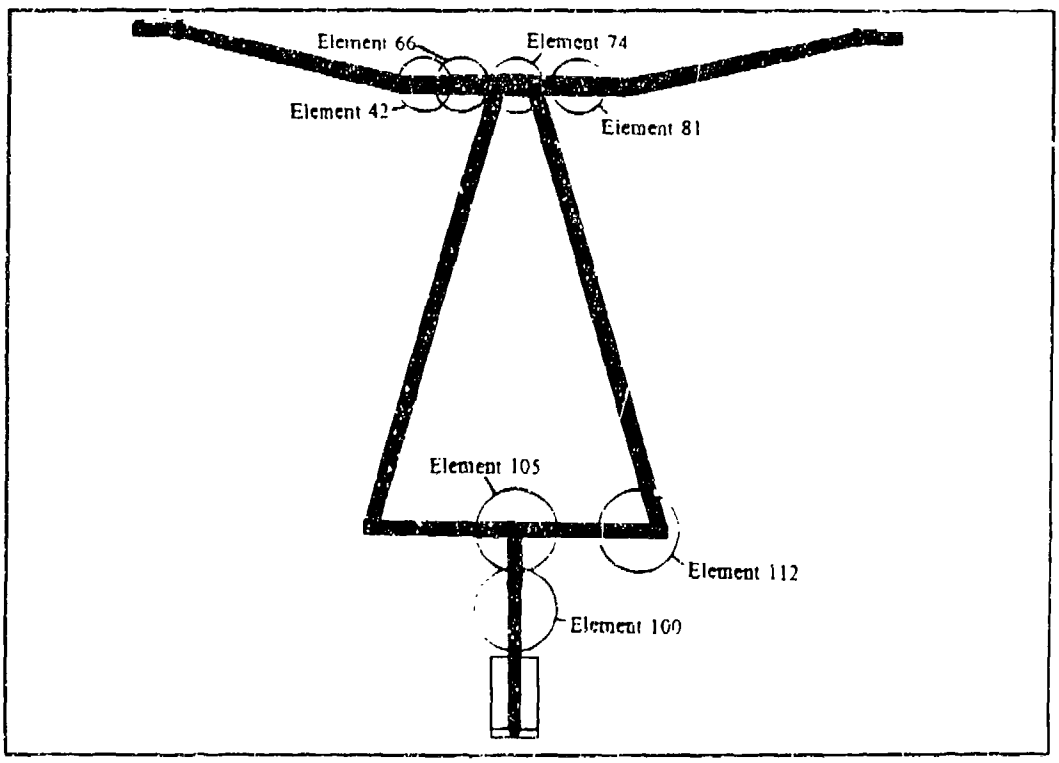


Figure 5.4: Elements Containing Strain Gages

mounting points. When this design was loaded to 3200 lbs (aft right CG) a deflection in the aft crosstube exceeding five inches was experienced, and the crosstube itself was bent. In addition to shortening the crosstube, to minimize the deflection, a 4130 steel rod (1 1/4 inch diameter) was sleeved into existing holes in the gear legs for additional support.

The gear for the first two tests had the longitudinal tubes mounted under the crosstube and the torque tube and secured by one vertical bolt through both tubes. This arrangement still exists on the aft crosstube, shown in Figure 5.5, to ensure adequate clearance of the undercarriage of the aircraft.

During the second set of tests, the grade 8 steel bolts securing the forward end of the longitudinal tubes were bent. Element 112 which was closest to this point experienced a stress of -1.05E4 psi with the yield stress being 6.33E4 psi. The simplifications made in the computer model resulted in inadequate prediction of stress in the bolts.

To correct this deficiency, the gear was reconfigured with a cap piece welded on the end of the longitudinal tube and then sleeved over the end of the torque tube as shown in Figure 5.6. This configuration was used for the remainder of the tests.

D. RESULTS

1. Preliminary Results

Differences in the predicted results vs the actual results, examined prior to the plastic deformation of the bolt, were thought to be related to the inability of the

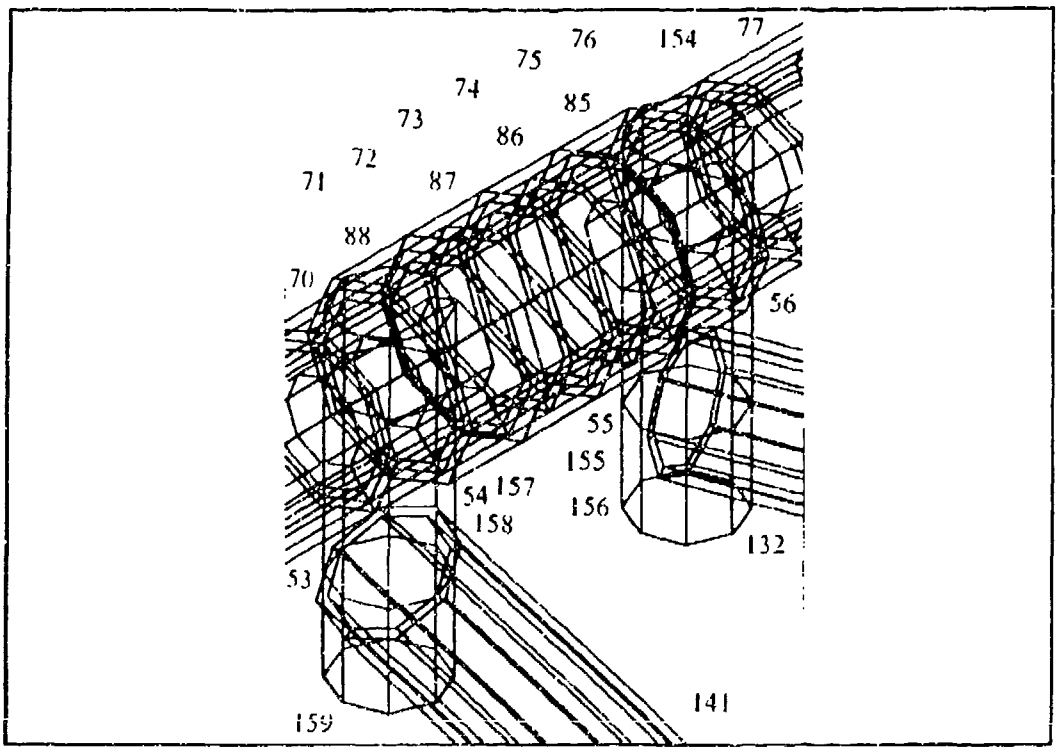


Figure 5.5: Center Aft Crosstube

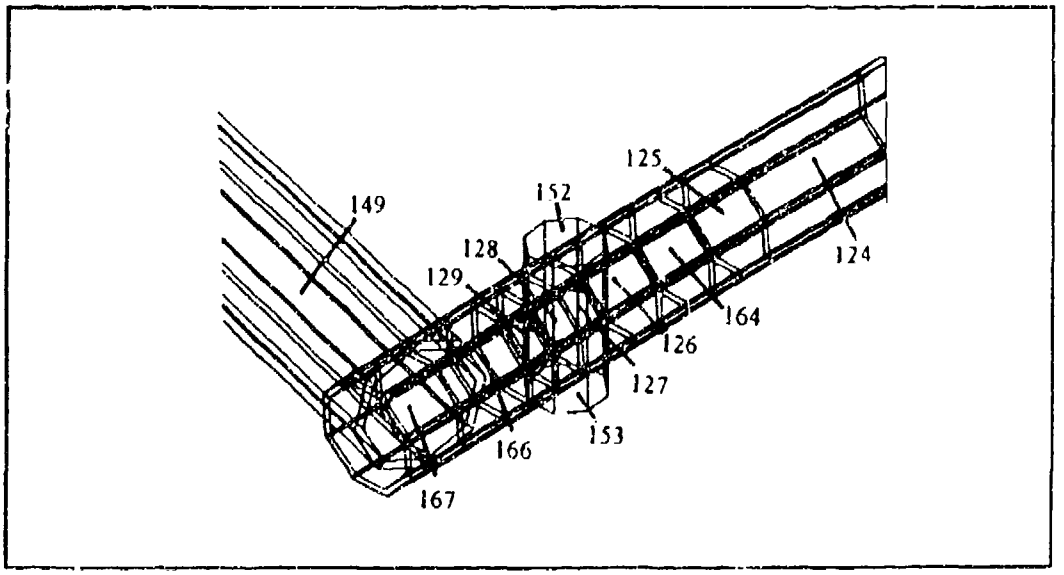


Figure 5.6: Junction of Longitudinal Tube and Torque Tube

axles to move freely. Therefore, for the remainder of the tests, the axles rested on 1/8 inch sheets of teflon.

2. Defective Gages

The 45° strain gage of the rosette at element 81 was damaged during installation and the 45° strain gage of the rosette at element 100 was damaged during testing. The remaining strain gages of those rosettes were inadequate to obtain a valid comparison with the predicated stress values. The data from element 100 is shown in Figure 5.7.

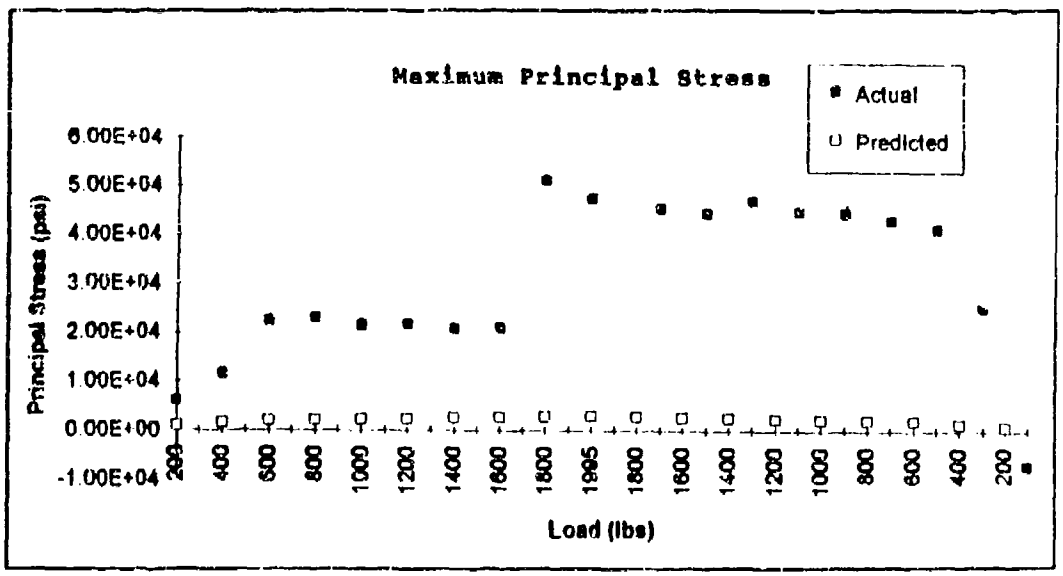


Figure 5.7: Element 100, Aft Right CG Location

3. Elements 100 and 105 Results

Rosettes at elements 112 , 105 and the lateral strain gage from element 74 were measured by the SB-10 Switch and Balance Unit and the P-3500 Strain Indicator and the balance of the rosettes at elements, 44, 66 and the 45° and longitudinal strain

gages of element 74 were measured by two BAM1s. Test gear is described in detail in Appendix C.

From the results in Figures 5.8 to 5.11 for element 112 and Figures 5.12 to 5.15 for element 105 it appeared a problem existed with the P-3500 in reading the higher microvoltages. The gages exhibit expected results at lower loads and good correlation with the predicted results, but at higher loads they appeared to achieve a maximum value.

During trouble shooting, a decade box was wired in parallel with the compensating resistor and the P-3500 indicated the correct values. The P-3500 and the SB-10 were also verified to correctly measure the strain.

4. Element 74

During the trouble shooting, the decade box was also used to check the BAM1s readings. Instead of the expected 1000 microstrains, values of 225 to 650 microstrains were obtained. Consequently all results taken from the BAM1's were multiplied by the appropriate gain factor. The resulting data was better than the uncorrected readings, where test values differed from the predicted values not only by magnitude but by sign.

Element 74's corrected results indicated it experienced stresses beyond the yield stress of 6.33E4 psi at all five CG locations as shown in Figures 5.16 and 5.17. Because no permanent deformation of the element was observed, it was hypothesized that the erroneous data was a result of the previously discussed problem with the P-3500 and/or the gain factor associated with the BAM1 readings.

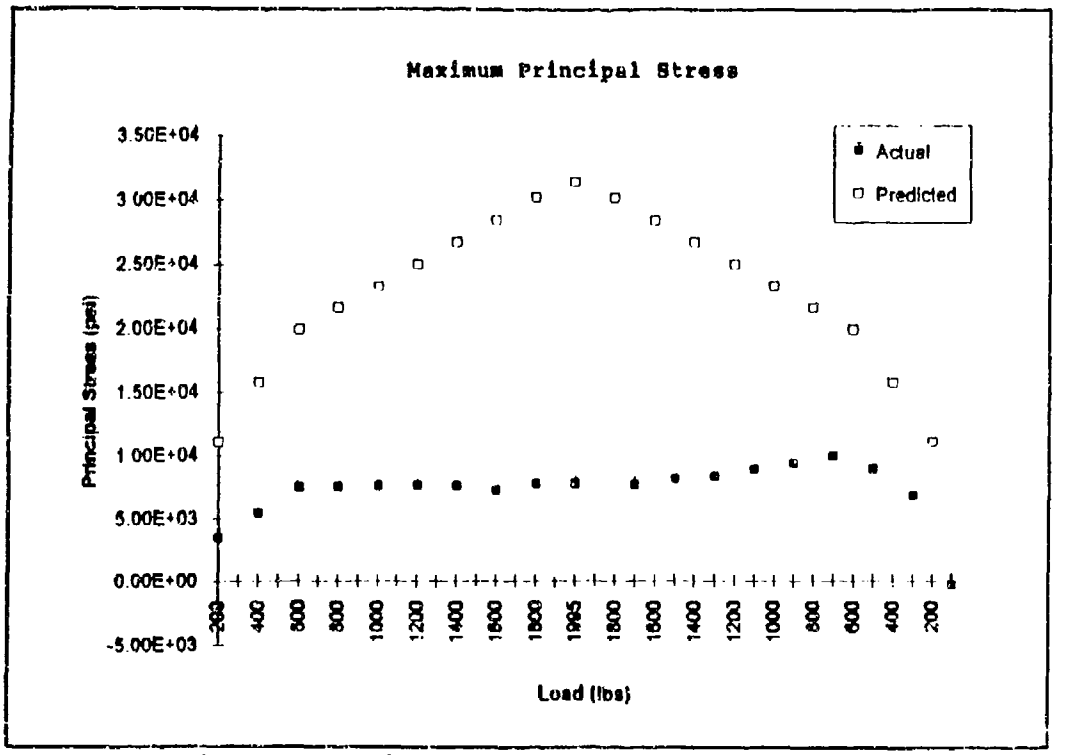


Figure 5.8: Element 112, Aft Right CG Location

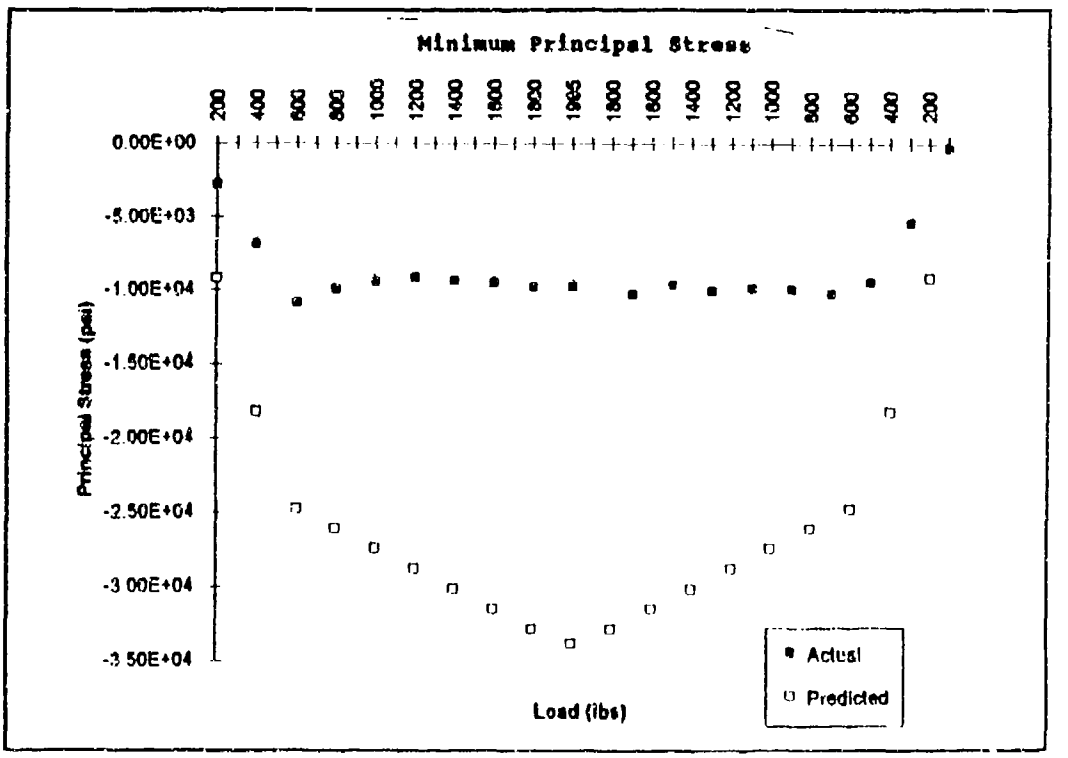


Figure 5.9: Element 112, Aft Right CG Location

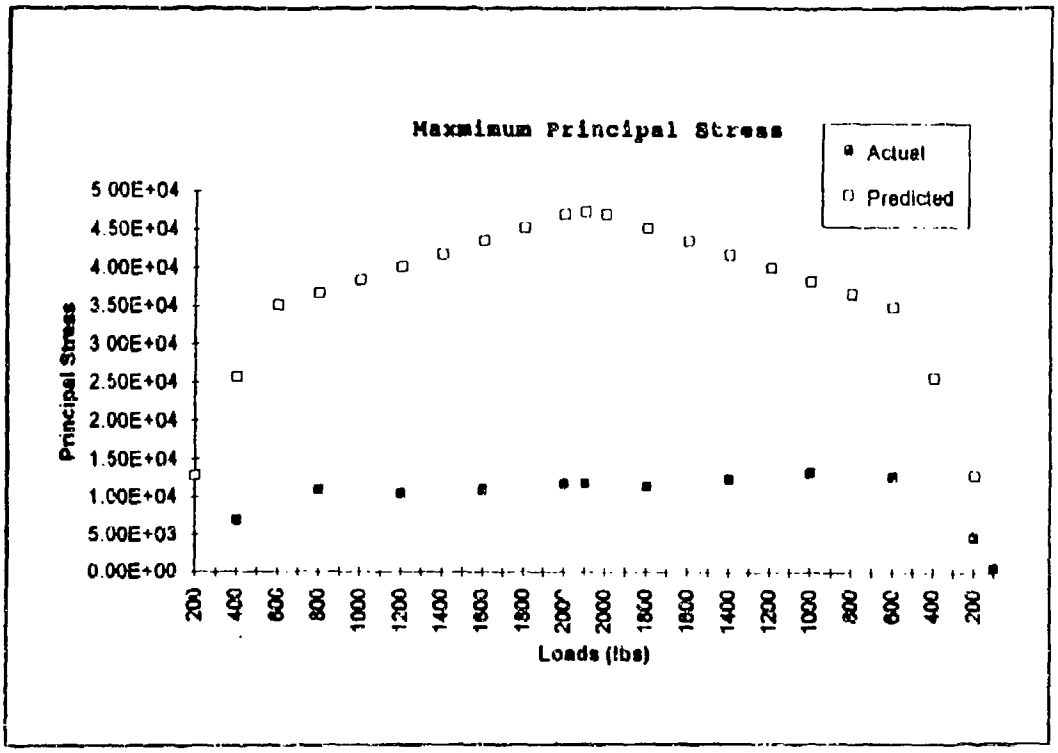


Figure 5.10: Element 112, Aft Left CG Location

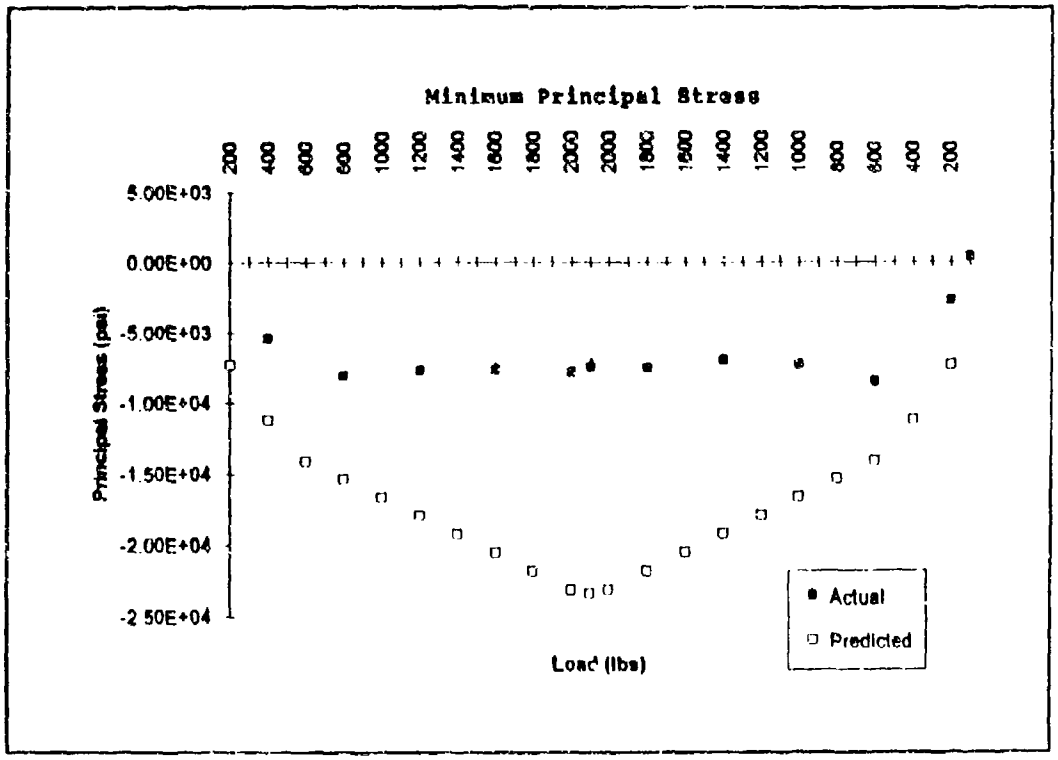


Figure 5.11: Element 112, Aft Left CG Location

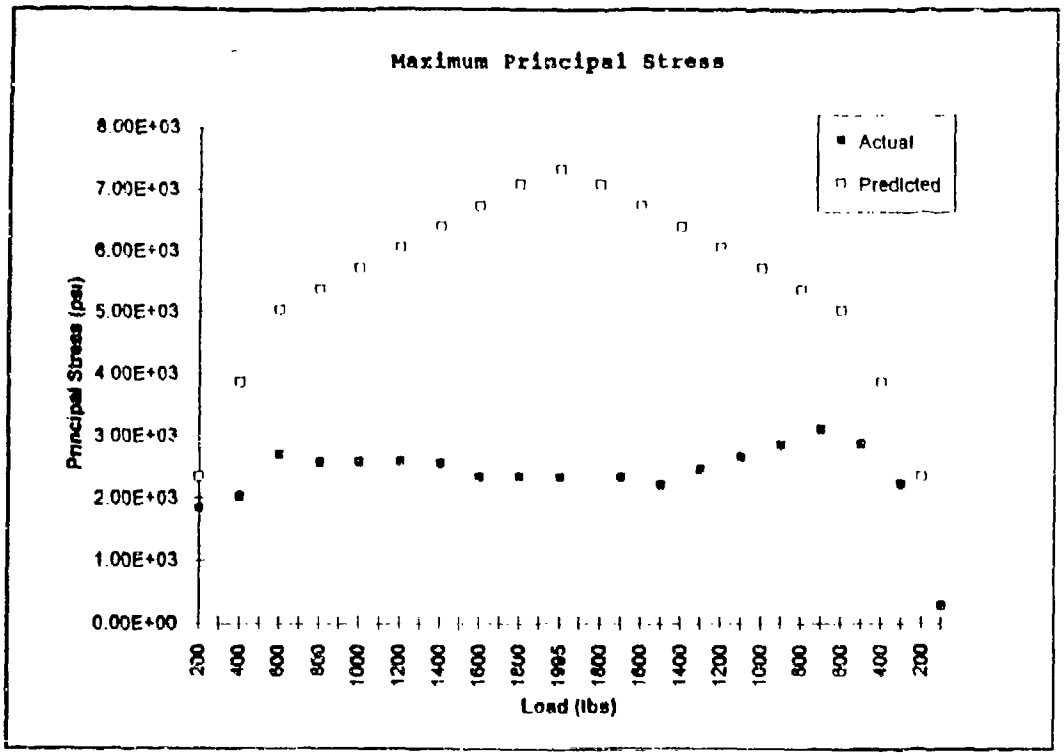


Figure 5.12: Element 105, Aft Right CG Location

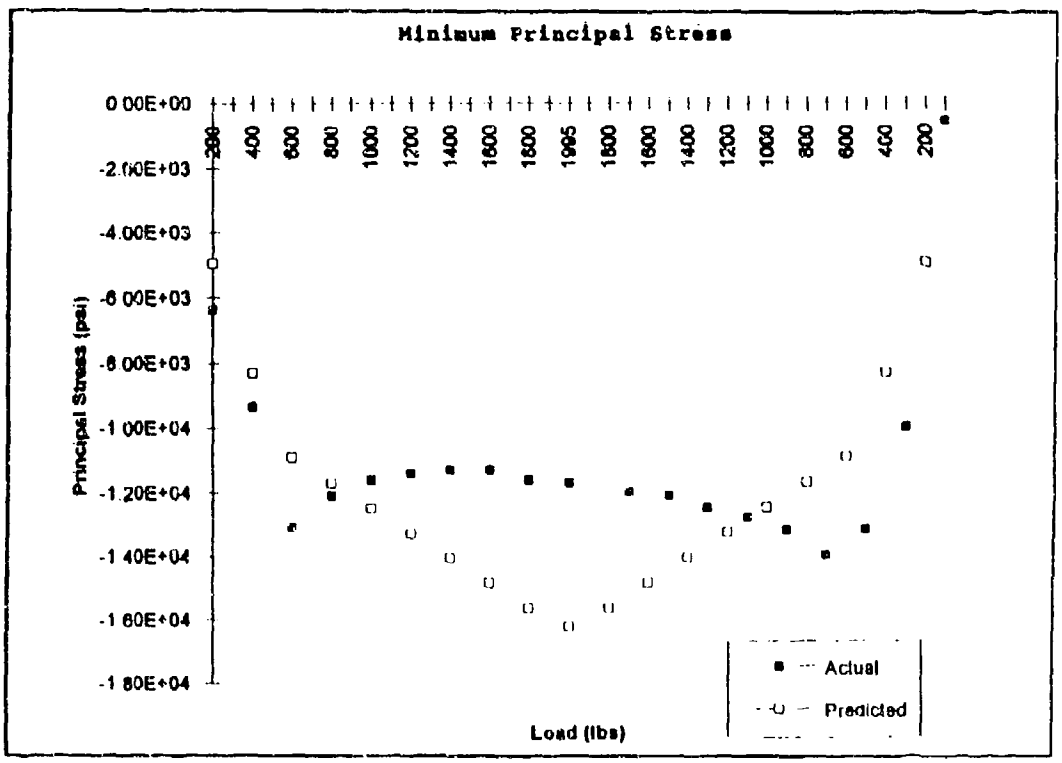


Figure 5.13: Element 105, Aft Right CG Location

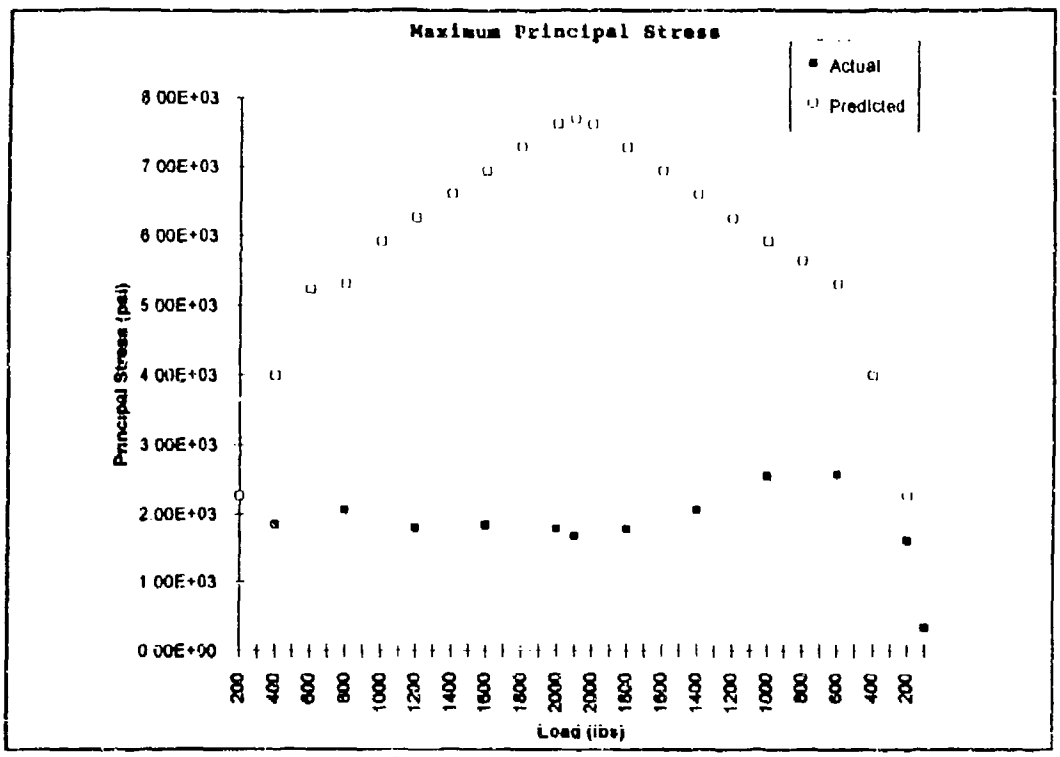


Figure 5.14: Element 105, Aft Left CG Location

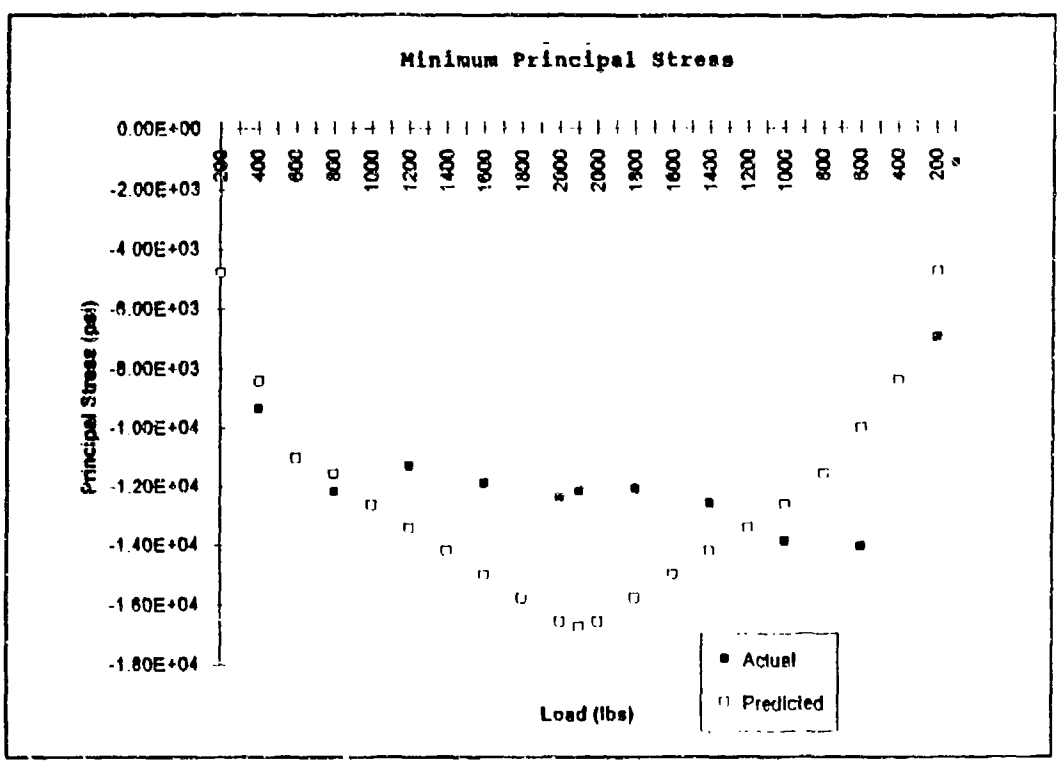


Figure 5.15: Element 105, Aft Left CG Location

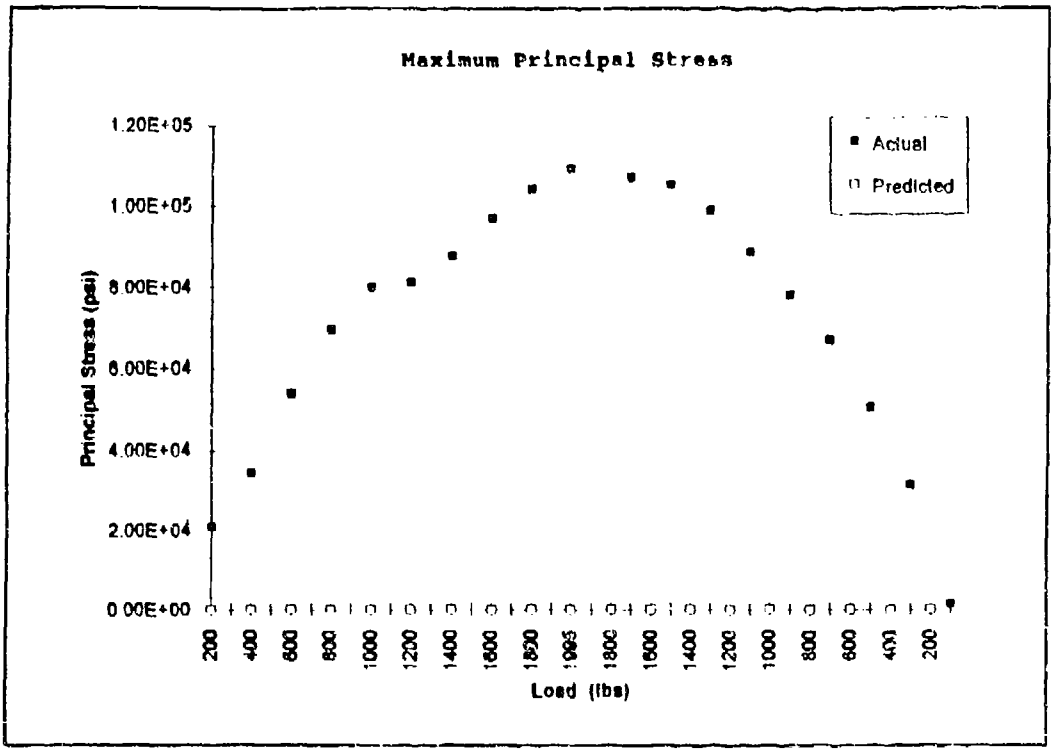


Figure 5.16: Element 74, Aft Right CG Location

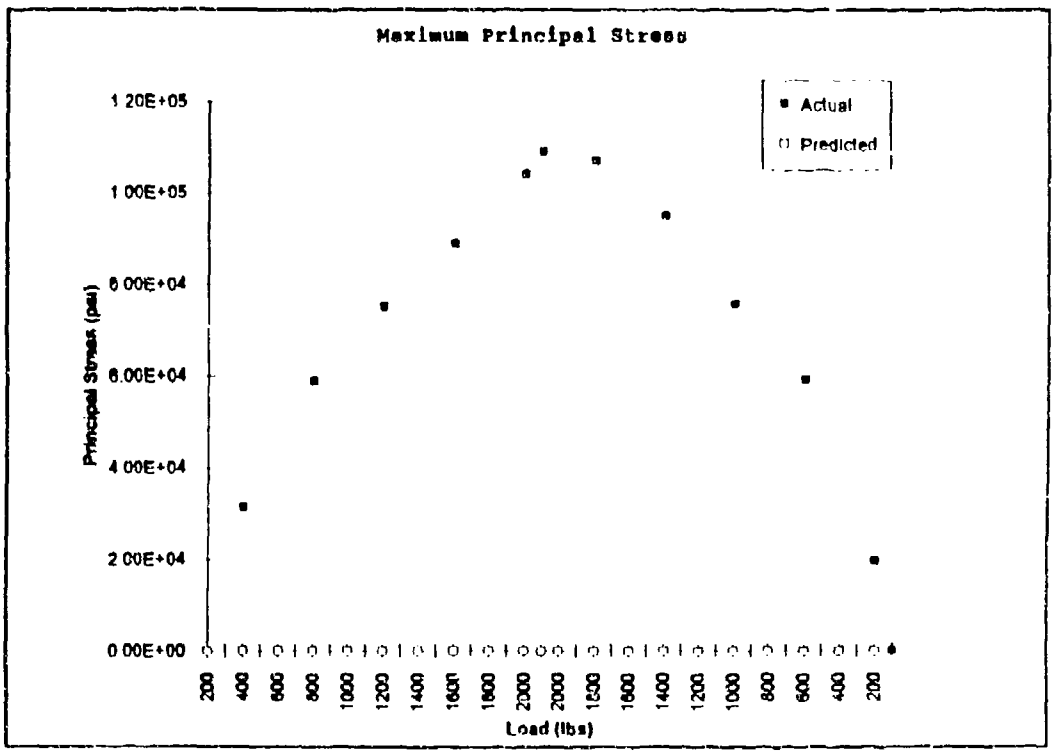


Figure 5.17: Element 74, Aft Left CG Location

5. Elements 66 and 42

No meaningful conclusions are drawn from the data taken at element 66 due to the scatter exhibited in Figures 5.18 and 5.19. While the minimum principal stress values for element 42, presented in Figures 5.20 to 5.23, compared favorably with the predicted values and general trends were observed in element 66's results the questionable validity of the gain factor precludes a meaningful discussion of the correlation between the predicted and actual stresses.

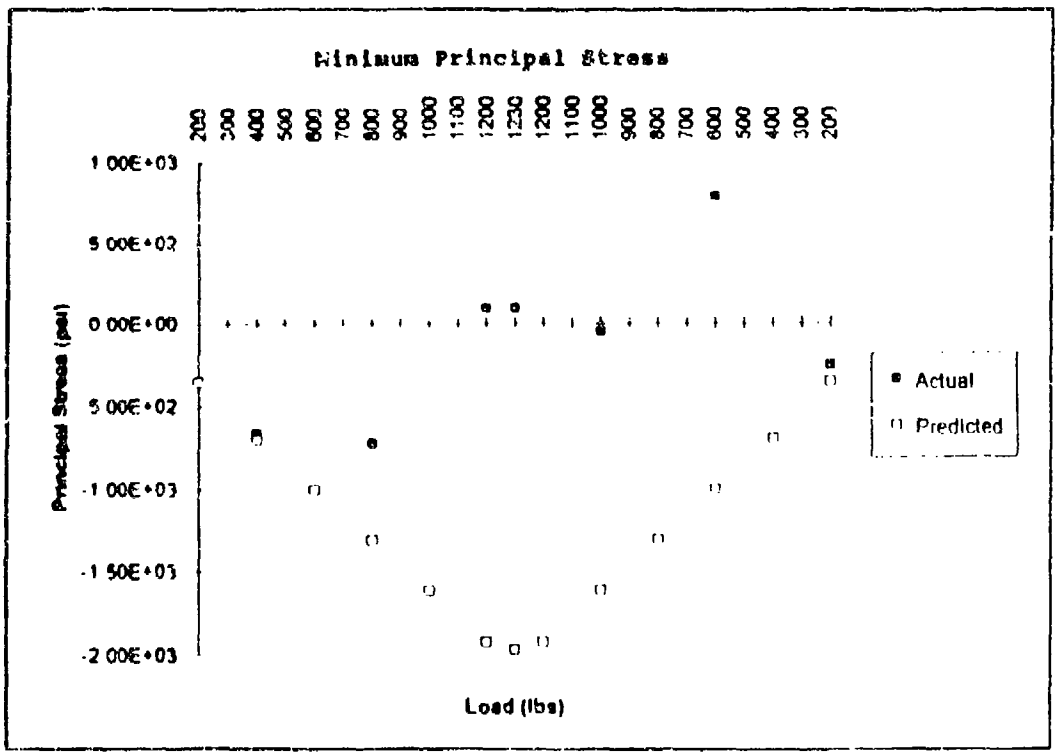


Figure 5.18: Element 66, Forward Left CG Location

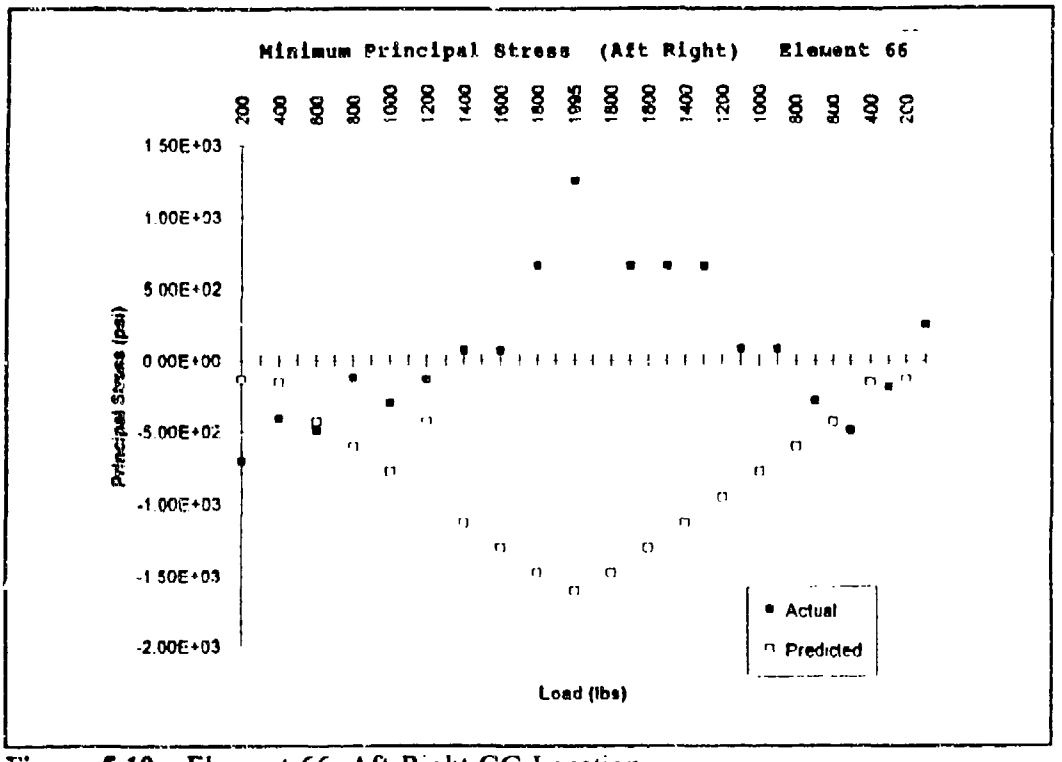


Figure 5.19: Element 66, Aft Right CG Location

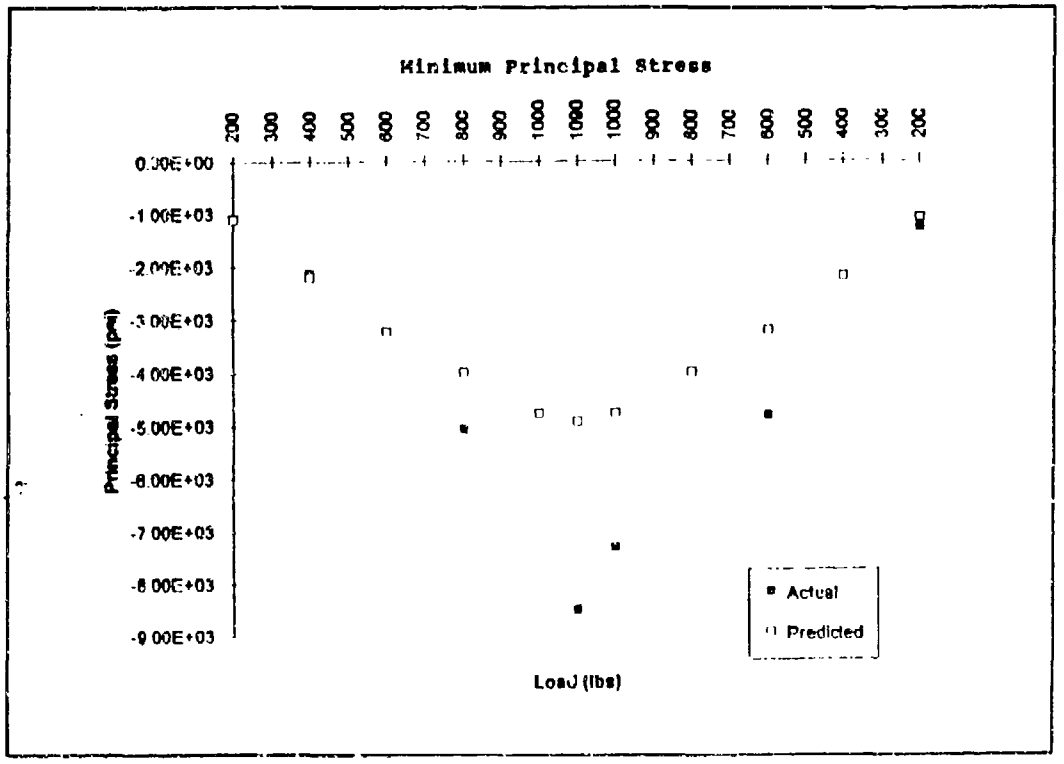


Figure 5.20: Element 42, Centerline CG Location

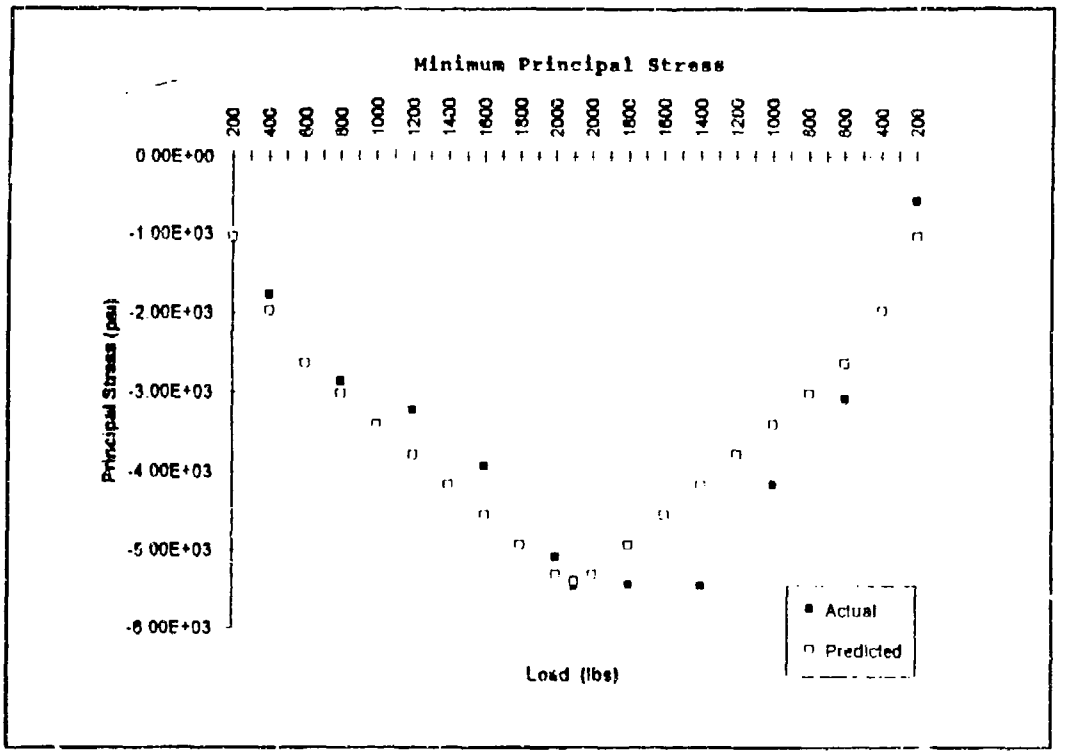


Figure 5.21: Element 42, Aft Left CG Location

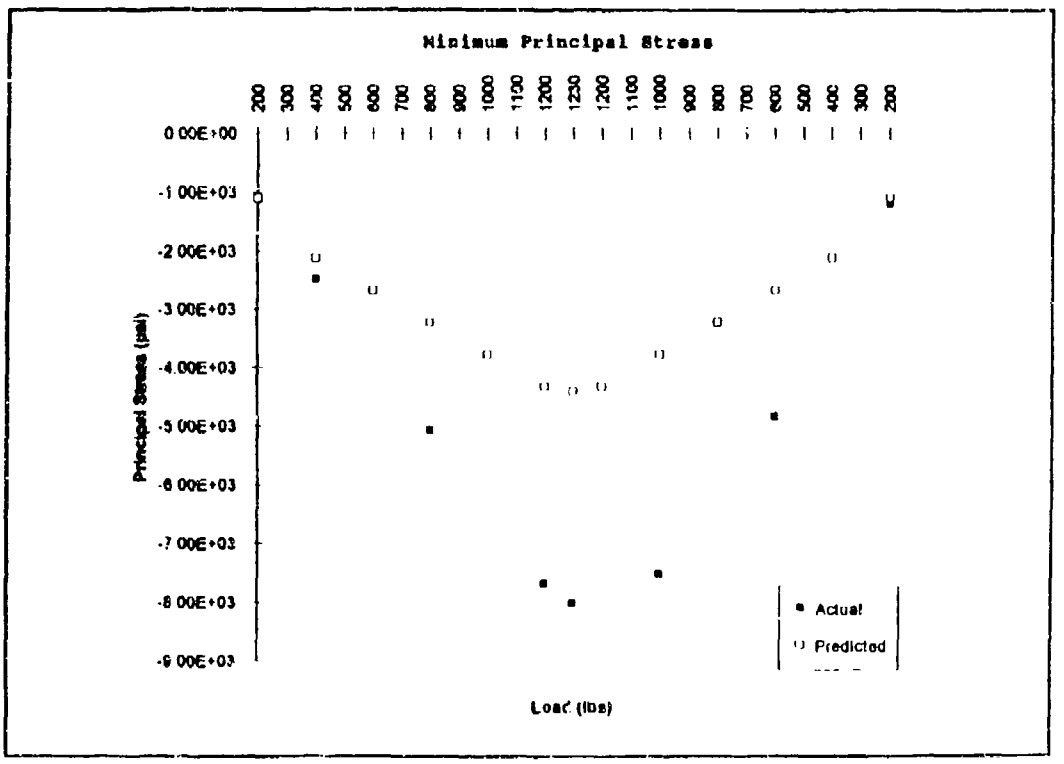


Figure 5.22: Element 42, Forward Left CG Location

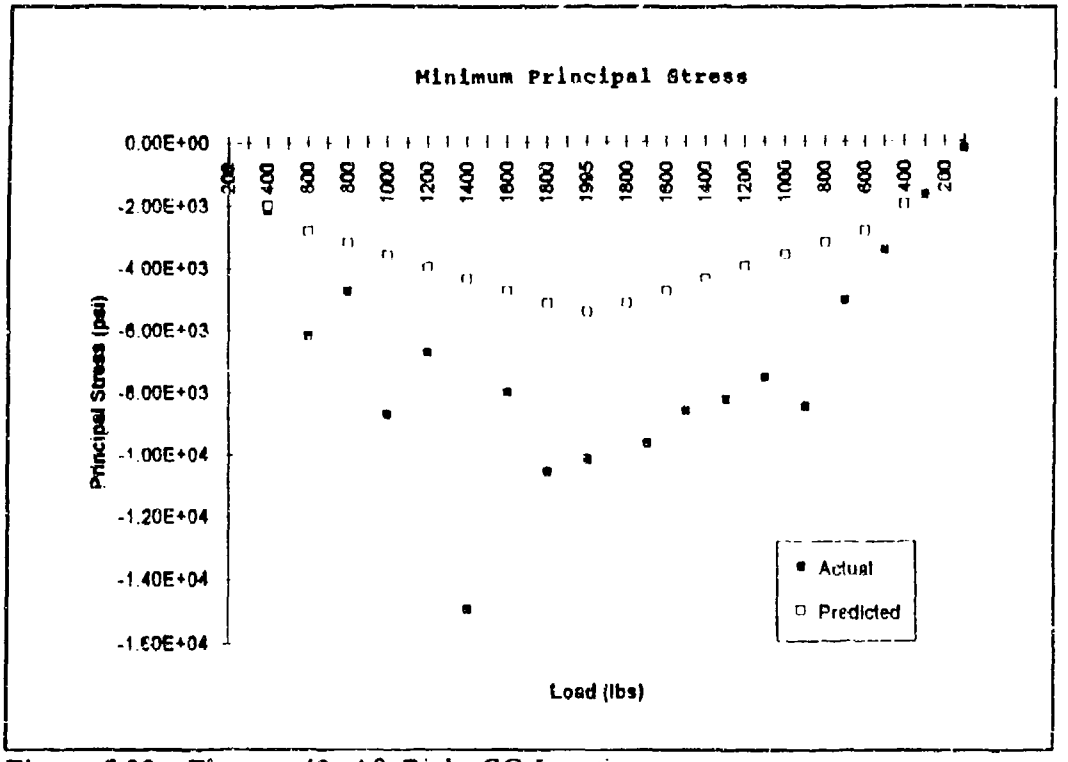


Figure 5.23: Element 42, Aft Right CG Location

6. Deflections

The deflections for the aft right CG load case are presented in Figures 5.24 and 5.25. While computer model simulation simplifications contributed to the difference between the actual and the predicted values, the majority of the difference was caused by inability of axles to slide freely on the teflon sheets.

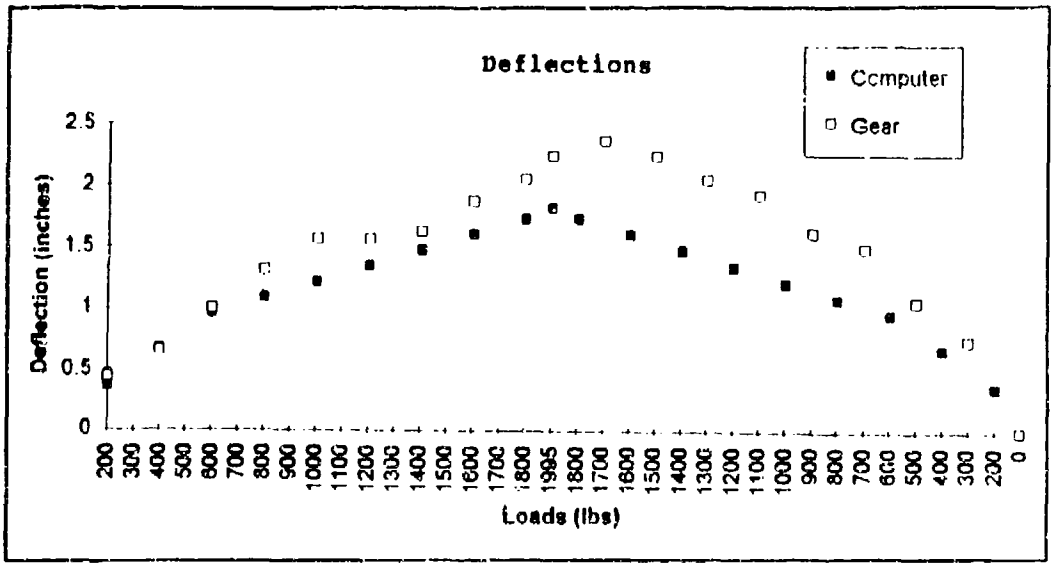


Figure 5.24: Forward Torque Tube Deflections

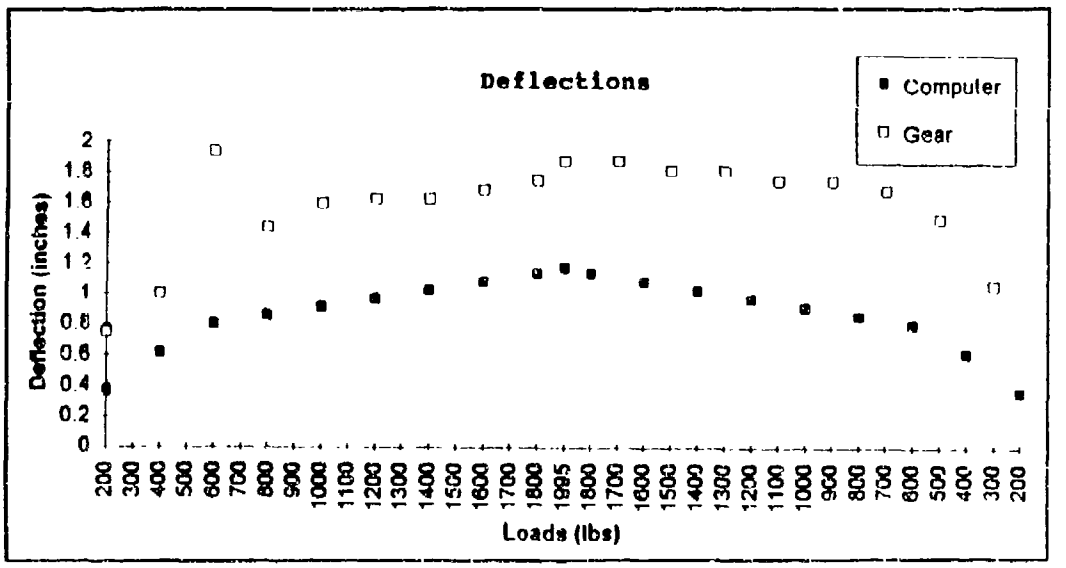


Figure 5.25: Aft Crosstube Deflections

VI. CONCLUSIONS

A. SELECTION CRITERION

1. Agility

The wheeled gear system provides significant land-based and maritime-based operational benefits over the skid gear system. Movement of the aircraft on board ships for maritime use is simplified without the requirement to attach the removable wheels. Similarly, during land-based operation, movement on remote locations of the field or at fields with limited support becomes much easier. The drawbacks of the enhanced ground agility is the necessity for ensuring the brakes are locked for shipboard landings to prevent rolling. Considering these factors, the advantages of wheeled gear outweigh the disadvantages.

2. Aircraft Modification

Despite the use of off the shelf equipment, the addition of a wheeled gear system does require some aircraft modification. Aircraft modifications include:

- The addition of brake pedals.
- The addition of pedal linkages and hydraulics.
- A small horizontal movement of the center of gravity of less than one inch.
- Finally, a vertical lowering of the center of gravity of the aircraft by approximately two inches.

The first three changes are minor and should pose no problems. The change in vertical CG location will enhance ground static stability but the effects upon the aircraft dynamics stability warrant further study.

3. Taxiing

Moving from the parking ramp to the point of takeoff with a skid system requires air taxiing. Wheeled ground maneuvering is inherently more safe and the reduced downwash associated with wheeled maneuvering leads to a reduction of ingested foreign objects in the aircraft engines.

4. Footprint

The wider footprint of the wheeled gear system will improve lateral stability. This is offset by the decreased stability in the directions of 45° either side of the nose.

5. Strength

In its present configuration, the weak nose wheel attachment tube will cause the aircraft to pitch forward during a sufficiently hard landing. While a level attitude would cause the least collateral damage, a forward pitch would preserve the tail rotor, whose high rotational velocity has the potential for inflicting lethal damage upon impact.

6. Weight

The increase in the weight is a definite liability to the wheeled gear system. The greater weight will require a proportional increase in the other aspects of the gear system to offset this disadvantage.

7. Tail Stinger Clearance

The unloaded wheeled gear increases the tail stinger clearance by five inches. This condition should be reexamined after any modifications to the nose wheel assembly and upon installation on the helicopter. While additional clearance is beneficial, the effects of changing the landed level attitude should be investigated.

B. CONCLUSIONS

The inability to make quantitative analysis of stresses experienced by the wheeled gear system does not preclude the realization that the wheeled system has merits that make it worth further investigation. Because plastic bending occurred in the nose wheel attachment tube, additional testing should not be conducted until this weakness is addressed. Upon completion of the test plan in Appendix C, a determination of applicability to Navy applications can be made.

C. RECOMMENDATIONS

The following recommendations are made for improvement of follow-on testing:

- As can be seen in pertinent figures in Chapter V, the gear did not experience hysteresis. Future testing need only record data as the gear is being loaded.

- Refine the computer model to reduce the simplifications listed in Chapter III to improve the GIFTS simulation.

- Reload the wheeled gear system to 3200 lbs and measure the microvoltages generated by the gages.

- Select gages for further testing whose optimum operating range include the measured microvoltages.

- Measurement equipment should have undergone recent calibration and be capable of measuring the expected microvoltages.

- Relocate new strain gages at expected areas of high stress determined by new GIFTS model simulation.

- Setup a new test rig to include application of the loads by hydraulics force and a load measurement system accurate to 10 lbs.

- Load mount points independent of each other so the load at one mount point does not apply a force to another mount point, or pull on the test rig from a single point coincident with the CG.

- Have the gear rest on a level surface that allows movement of axles with minimum friction.

Appendix A

```
KPOINT
$ FWD CROSSTUBE
$ PTS 1 AND 7 ARE AT CENTER OF
SKID TUBE, NOT END OF
CROSSTUBE
1
72.42,4,-37.2
2
72.73,11.68,-31.28
3
73,18.3,-15.3
8
73,18.3,-13.2
4
73,18.3,0.0
9
73,18.3,13.2
5
73,18.3,15.3
6
72.73,11.68,31.28
7
72.42,4,37.2
$ AFT CROSSTUBE
$ PTS 31 AND 37 ARE AT CENTER OF
SKID TUBE, NOT END OF
CROSSTUBE
31
129.71,4.0,-37.2
32
129.85,10.0,-31.28
33
130,16.62,-15.7
70
130,16.62,-13.125
38
130,16.62,-10.25
34
130,16.62,0
39
130,16.62,10.25
71
130,16.62,13.125
35
130,16.62,15.7
36
129.85,10.0,31.28
37
129.71,4.0,37.2
$ LEFT SKID TUBE
51
62.52,4.0,-37.2
52
136.92,4.0,-37.2
$ RIGHT SKID TUBE
61
62.52,4.0,37.2
62
136.92,4.0,37.2
99
0,0,0

ELMAT,4
$ MATERIAL 1 (AL7075-T6), SHEAR
MODULUS DEFINED
1
73000,10.4E6,.368,2.616E-4

LETY
BEAM2
$      FORWARD CROSSTUBE
$ MATL 1, CROSS SECTION 1
1,1
CARC,10
L13
1,2,3,10,1

33
L57
5,6,7,10,1

37

SLINE,10
L38
3,8,3,1

99
L84
8,4,3,1

99
```

```
L49
4,9,3,1

99
L95
9,5,3,1

99

$      AFT CROSSTUBE
LETY
BEAM2
1,2
CARC,10
L3133
31,32,33,10,1

1
L3537
35,36,37,10,1

7

SLINE,10
L3370
33,70,3,1

5
L7038
70,38,3,1

5
L3834
38,34,3,1

5
L3439
34,39,3,1

5
L3971
39,71,3,1

5
L7135
71,35,3,1

5

$ LEFT SKID TUBE
LETY
BEAM2
1,3
SLINE,10
L511
51,1,2,1

99
L131
1,31,4,1

99
L3152
31,52,2,1

99
$ RIGHT SKID TUBE
L617
61,7,2,1

99
L737
7,37,4,1

99
L3762
37,62,2,1

99

END
```

```
$ BATCH FILE FOR LOAD
$ BOUNDARY CONDITIONS
SUPP,1
8/9/70/71//
SUPL,2
L511/L131/L3152/L617/L737/L3762//
SUPP,3
4/34//
SUPP,4
8/9/70/71//
SUPP,5
8/9/70/71//
SUPP,6
8/9/70/71//
$ APPLIED LOADS
LOADP,2
8
-1
9
-1
70
-1
71
-1

MASS

END
```

```
CIRCH
1
$       OUTER RADIUS, INNER RADIUS (IN)
$       FORWARD CROSSTUBE
1.125,.985
$       AFT CROSSTUBE
2
1.125,.969
$       SKID TUBE
3
1.5,1.435

END
```

Appendix B

```
$ OUTER RADIUS, INNER RADIUS (IN)
CIRCH
$ BEAM FROM 1 TO 8  TAPERS  688
$ TO 1 0
1
88, 563
2
36, 563
3
85, 563
4
34, 563
5
58, 563
6
80, 563
7
4, 563
8
1 0,.563
$ BEAM FROM 10 TO 12  TAPERS IIN
$  TO .875
11
5,.563
$      POINT 12
12
75,.563
$      POINT 13
13
99,.563
$      JOINING TUBE
14
1 125,1 0
$    NOSE WHEEL ATTACHMENT TUBE
15
45,.609
$      NOSE T BRACKET BASE
16
75,.745
$      NOSE T BRACKET CROSS PIECE
17
75,.75
$      TORQUE TUBE
18
5, 66
$      NOSE FORK
RECTS
19
6,3 25
$ BOLTS
CIRCS
20
21
$ JOINING ROD
22
1 25
$ AXILS
RECTS
23
2 0, 625

CIRCS
24
5

END
```

```
$ OUTER RADIUS, INNER RADIUS (IN)
CIRCH
$ BEAM FROM 1 TO 8  TAPERS  688
$ TO 1.0
1
88,.563
2
36,.563
3
85,.563
4
34,.563
5
58,.563
6
80,.563
7
4,.563
8
1.0,.563
$ BEAM FROM 10 TO 12  TAPERS 1IN
$  TO .875
11
5,.563
$      POINT 12
12
75,.563
$      POINT 13
13
99,.563
$      JOINING TUBE
14
1.125,1.0
$   NOSE WHEEL ATTACHMENT TUBE
15
45,.609
$      NOSE T BRACKET BASE
16
75,.745
$      NOSE T BRACKET CROSS PIECE
17
75,.75
$      TORQUE TUBE
18
5,.66
$      NOSE FORK
RECTS
19
6,3.25
$ BOLTS
CIRCS
20
21
$ JOINING ROD
22
1.25
$ AXILS
RECTS
23
2.0,.625

CIRCS
24
5

END
```

```
KPOINT
$       LEFT GEAR
1
-6 5,11 25,42 85
2
-5 49,13 36,38 96
3
-4 61,15 47,35 06
4
-3 71,17 58,31 17
5
-3 28,18 64,29 22
6
-2 89,19 56,27 52
7
-1 85,22 04,22 95
8
- 48,25 32,16 89
33
- 25,25 45,15 69
9
0,25 92,14 55
10
0,25 92,10 30
14
0,25 92,9 5
15
0,25 92,8 2
11
0,25 92,6 78
12
0,25 92,3 25
34
0,25 92,2 25
13
0,25 92,1 25
$       RIGHT GEAR
16
0,25 92,-1 25
35
0,25 92,-2 25
17
0,25 92,-3 25
18
0,25 92,-6 78
30
0,25 92,-8 2
29
0,25 92,-9 5
19
0,25 92,-10 30
20
0,25 92,-14 55
32
- 25,25 45,-15 69
21
- 48,25 32,-16 89
22
-1 85,22 04,-22 95
23
-2 89,19 56,-27 52
24
-3 28,18 64,-29 22
25
-3 71,17 58,-31 17
26
-4 61,15 47,-35 06
27
-5 49,13 36,-38 96
28
-6 5,11 25,-42 85
$       CENTER TUBE
31
0,25 92,0
$       NOSE WHEEL
ATTACHMENT TUBE
101
79 75,5 12,0
102
79 75,6 37,0
103
79 75,12 37,0
104
79,14 37,0
117
78 5,15 37,0
105
77 75,16 37,0
106
76 08,17 75,0
107
63 75,21 87,0
108
62 22,22 72,0
109
56 97,25 63,0
$       TORQUE TUBE
110
55,26 72,0
111
55,26 72,-17
112
55,26 72,-13 125
113
55,26 72,-15 75
118
55,26 72,-4 5
119
55,26 72,4 5
114
55,26 72,15 75
115
55,26 72,13 125
116
55,26 72,17
$       NOSE WHEEL
FORK
120
80 75,6 75,0
121
79 75,6 75,0
122
70 75,6 75,0
$       LONGITUDINAL
TUBE ATTACHMENT
BOLTS
50
0,26 92,-2 25
51
0,23 41,-2 25
52
0,22 03,-2 25
60
0,26 92,2 25
61
0,23 41,2 25
62
```

```
0,22.03,2.25
70
55,24.72,-15.72
72
55,25.72,-15.75
80
55,27.72,15.75
82
55,25.72,15.75
$     AXILS
130
-6.5,8.75,42.85
131
-6.5,8.0,42.85
132
-6.5,8.25,48.35
140
-6.5,8.75,-42.85
141
-6.5,8.0,-42.85
142
-6.5,8.25,-48.35
$     LONGITUDINAL
TUBE FWD POINT
71
55,26.72,-18.15
81
55,26.72,18.15
$
LONGITUDINAL/TORQ
UE TUBE JOINT
75
55,26.72,-14
76
55,26.72,-19
85
55,26.72,14
86
55,26.72,19
$     REFERENCE
POINT
99
0,0,0

ELMAT,4
$     MATERIAL 1
(6150)
1
$     MATERIAL 2
(4130)
2
9.7E4,3E7, 302,7.324E-4
$     MATERIAL 3
(4340)
3
2.07E5,2.95E7, .304,7.324
E-4
$     MATERIAL 4
(4140)
4
1.48E5,2.9E7, 303,7.324E-
4
$     GEAR LEGS
LETY
BEAM2
$     CURVES
$ MATERIAL 1, CROSS
SECTION 8
1,8
CARC,10
L89
8,33,9,3,1

99
L2021
20,32,21,3,1

99

$     UNTAPERED
HORIZONTAL (PT 9 TO
10)
SLINE,10
L910
9,10,3,1

99
L1920
19,20,3,1

99
L1014
10,14,3,1

99
L1415
14,15,3,1

99
L1929
19,29,3,1

99
L2930
29,30,3,1

99

$     TAPERED
SECTIONS
LETY
BEAM2
$ MATERIAL 1 CROSS
SECTION 1
1,1
SLINE,10
L12
1,2,3,1

99
L2728
27,28,3,1

99

LETY
BEAM2
$ MATERIAL 1 CROSS
SECTION 2
1,2
SLINE,10
L23
2,3,3,1

99
L2627
26,27,3,1
```

```
99

LETY
BEAM2
$ MATERIAL 1 CROSS
SECTION 3
1,3
SLINE,10
L34
3,4,3,1

99
L2526
25,26,3,1

99

LETY
BEAM2
$ MATERIAL 1 CROSS
SECTION 4
1,4
SLINE,10
L45
4,5,3,1

99
L2425
24,25,3,1

99

LETY
BEAM2
$ MATERIAL 1 CROSS
SECTION 5
1,5
SLINE,10
L56
5,6,3,1

99
L2324
23,24,3,1

99

LETY
BEAM2
$ MATERIAL 1 CROSS
SECTION 6
1,6
SLINE,10
L67
6,7,3,1

99
L2223
22,23,3,1

99

LETY
BEAM2
$ MATERIAL 1 CROSS
SECTION 7
1,7
SLINE,10
L78
7,8,3,1

99
L2122
21,22,3,1

99

LETY
BEAM2
$ MATERIAL 1 CROSS
SECTION 11
1,11
SLINE,10
L1115
11,15,3,1

99
L3018
30,18,3,1

99

LETY
BEAM2
$ MATERIAL 1 CROSS
SECTION 12
1,12
SLINE,10
L1211
12,11,3,1

99
L1817
18,17,3,1

99

LETY
BEAM2
$ MATERIAL 1 CROSS
SECTION 13
1,13
SLINE,10
L1234
12,34,1,1

99
L3413
34,13,1,1

99
L1635
16,35,1,1

99
L3517
35,17,1,1

99

$    AXIL BRACKET
LETY
BEAM2
$ MATERIAL 3 CROSS
SECTION 23
3,23
SLINE,10
L1130
1,130,1,1
```

```
99
L130131
130,131,1,1

99
L28140
28,140,1,1

99
L140141
140,141,1,1

99

$      AXIL ROD
LETY
BEAM2
$ MATERIAL 3 CROSS
SECTION 24
3,24
SLINE,10
L130132
130,132,1,1

99
L140142
140,142,1,1

99

$      JOINING TUBE
LETY
BEAM2
$ MATERIAL 2 CROSS
SECTION 14
2,14
SLINE,10
L1514
15,14,4,1

99
L1511
15,11,3,1

99
L1112
11,12,3,1

99
L1213
12,13,3,1

99
L1331
13,31,3,1

99
L3116
31,16,3,1

99
L1617
16,17,3,1

99
L1718
17,18,3,1

99
L1830
18,30,3,1

99
L3029
30,29,4,1

99

$      JOINING ROD
LETY
BEAM2
1,22
SLINE,10
L3534
35,34,5,1

99

$      NOSE WHEEL
ATTACHMENT TUBE
LETY
BEAM2
$      CURVE
$      MATERIAL 3
CROSS SECTION 15
3,15
CARC,10
L103117
103,104,117,4,1

99
L117106
117,105,106,4,1

99

$      STRAIGHT
SECTION
SLINE,10
L101121
101,121,2,1

99
1121102
121,102,2,1

99
L102103
102,103,2,1

99
L106107
106,107,3,1

99
L107108
107,108,3,1

99
L108109
108,109,1,1

99

$      NOSE WHEEL
ATTACHMENT TUBE
SLEEVE
LETY
```

```
BEAM2
$ MATERIAL 2  CROSS
SECTION 16
2,16
SLINE,10
L108110
108,110,1,1

99

$       TORQUE TUBE
CROSS PIECE SLEEVE
LETY
BEAM2
$ MATERIAL 2  CROSS
SECTION 17
2,17
SLINE,10
L118110
118,110,1,1

99
L110119
110,119,1,1

99

$       TORQUE TUBE
LETY
BEAM2
$ MATERIAL 3  CROSS
SECTION 18
3,18

SLINE,10
L111113
111,113,4,1

99
L113112
113,112,4,1

99
L112118
112,118,4,1

99
L110118
110,118,4,1

99
L119110
119,110,4,1

99
L119115
119,115,4,1

99
L115114
115,114,4,1

99
L114116
114,116,4,1

99

$       NOSE WHEEL
FORK
LETY
BEAM2
$ MATERIAL 2  CROSS
SECTION 19
2,19
SLINE,10
L120121
120,121,1,1

99
L121122
121,122,1,1

99

$       LONGITUDINAL
TUBES
LETY
BEAM2
2,17
SLINE,10
L5171
51,71,10,1

99
L6181
61,81,10,1

99

$       LONGITUDINAL
ATTACHMENT BOLTS
LETY
BEAM2
1,20
SLINE,10
L70113
70,113,1,1

99
L11372
113,72,1,1

99
L80114
80,114,1,1

99
L11482
114,82,1,1

99

LETY
BEAM2
2,21
SLINE,10
L5035
50,35,1,1

99
L3551
35,51,1,1

99
L5152
51,52,1,1
```

```
99
L6034
60,34,1,1

99
L3461
34,61,1,1

99
L6162
61,62,1,1

99

$
LONGITUDINAL/TORQ
UE JOINT
LETY
BEAM2
2,18
SLINE,10
L75113
75,113,1,1

99
L113111
113,111,1,1

99
L11171
111,71,1,1

99
L7176
71,76,1,1

99
L85114
85,114,1,1

99
L116114
116,114,1,1

99
L11681
116,81,1,1

99
L8186
81,86,1,1

99

END
```

```
$ BATCH FILE FOR LOADBC
$ BOUNDARY CONDITIONS
SUPP,1
15/30/113/114//
SUPP,2
122/132/142//
SUPP,3
31/110//
SUPP,4
15/30/113/114//
SUPP,5
15/30/113/114//
SUPP,6
15/30/113/114//
$ APPLYING LOAD
LOADP,2
15
-1
30
-1
115
-1
112
-1

MASS
END
```

Appendix C

Static Testing Program for Advanced Controled Motion Enterprises Landing Gear

Experimental Test Series One - Landings

Purpose The first experimental tests will be under static conditions to determine the deflections and strains experienced by the gear when subject to various conditions modeling those encountered during landing.

Considerations The helicopter being modeled is the TH-57 B/C currently in use by the Navy as a primary helicopter trainer. The civilian equivalent is the Bell 206A-1.

Test A - Landing at Different Weights

Considerations The weights were chosen to simulate a normal landing, a 2g and a 3g landing. The impulse associated with the landings will not be recreated here.

The load at station LAT 4, STA 106 is out of limits because the AFCS off aft cg limit actually moves forward from station 114.2 at 2350 lbs to 111.4 at 3200 lbs.[1]

The 4 inches outside the longitudinal and lateral cg limit was chosen as an extreme condition because if the helicopter was flown in any of these conditions, the control authority would be insufficient to compensate and all loads experienced would be less than those experienced in normal flight.

The tests will be conducted with the tires removed, so deflections will be strictly those of the gear structure. The gear will be supported by bearings located at the tire mount points on the axles.

Description Weights duplicating those induced by a helicopter weighing 3200 lbs (max gross weight) (Table 1), 6400 lbs (Table 2) and 9600 lbs (Table 3) will be used. The loads are in the following format.

Right Rear Pt	Left Rear Pt
Right Front	Left Front

The center of gravity (cg) will be varied to simulate longitudinal and lateral limits (AFCS OFF, Max Gross Weight) and 4" beyond these limits. The structure will be loaded at the four helicopter attachment points.

Loads will be applied in 200 lb even increments and unloaded in 200 lb odd increments (up at 200, 400, 600, down at 500, 300, 100) to determine if the gear is subject to hysteresis.

Test B - Landing with Nose Wheel Deflected

Description Table 3 provides test conditions used to model the gear with the nose wheel placed at 45° deflection.

Test C - Single Point Landing

Description Each mounting point will be subject to 3200 lbs while the others remain at zero.

Test D - Landing with Obstacles

Considerations Raising one wheel mount will simulate experiencing landing with one wheel on an obstacle, or landing with two wheels in a depression. Raising two wheel mounts will simulate one wheel in a hole or two wheels on an obstacle.

For this test, the center of gravity is simulated at 56.4 WL, Station 110.1 and Centerline. The 7.5 inches that the wheel mount(s) is(are) raised will move the center of gravity out of either the longitudinal, the lateral or both limits.

Description At 3200 lbs (Table 1), three tests will be conducted where one wheel mount at a time will be raised 7.5 inches, followed by three tests where two wheel mounts at a time will be raised 7.5 inches.

Experimental Test Series Two - Towing

Purpose This series of tests will be to determine the strains and deflections experienced by the gear when subject to towing loads.

Considerations The modeled coefficients of friction (μ) are the largest values the gear is expected to experience and are thus the limiting case.

For BRAKES OFF, μ will be .10 created by a wet grass surface. For BRAKES ON, concrete has the greatest μ of .6. The nose wheel has no brakes and on concrete the μ will be .05.[2]

The weight used, 3200 lbs, is the aircraft maximum gross weight and the center of gravity will be simulated at Station 112, Centerline.

The formulas used are those applied to the case of static friction. Dynamic friction coefficients will be in effect once the gear is rolling, but must first be subject to the greater forces resulting from overcoming static friction.

Calculations

$T = F_{f\text{-nose}} + F_{f\text{-main}}$

$= \mu * W_n + 2 * \mu * W_m$

$F_f = \mu * W$
T = Force applied by towing
F_f = Force due to friction
W_n = weight on nose wheel
W_m = weight on main wheel

BRAKES OFF (Wet Grass)	BRAKES ON (Concrete)
T = .1*823 lbs + 2*.1*1189 lbs	T = .05*823 lbs + 2*.6*1189 lbs
= 320 lbs	= 1468 lbs

Description These weights will be applied at the towbar attachment points.

Equipment

Strain Gages

CEA-13-250UN-350
Resistance 350.0 ± .3%
Gage Factor (at 75° F) 2.12 ± .5%
Lot Number R-A48AF21

Strain Measuring Gear

SB-10 Switch and Balance Unit
Property Code 00096, Measurements Group, Inst Div Raleigh, NC
Calibrated June 18, 1986
P-3500 Strain Indicator
Calibrated July 7, 1986
BAMIs (Two of them)
Serial Numbers 2751 (013423 - USN Old Serial #) and Unknown (013422 USN Old Serial #)
BSG6s (Two of them)
Serial Numbers 2269 and 1948
Ellis Associates, Pelham, NY

Load Measuring Gear

Aft Right
Dillon Serial Number 27495
Calibrated Feb 21, 1992 From 100-5000 lbs ± 25 lbs
Aft Left

Dillon Serial Number 28964
Calibrated Feb 21, 1992 From 100 - 2500 lbs ± 50 lbs

Forward Right
Dillon Serial Number 27600
Calibrated Feb 21, 1992 From 50 - 2500 lbs ± 10 lbs

Forward Left
Dillon Serial Number 27601
Calibrated Feb 21, 1992 From 50 - 2500 lbs ± 10 lbs

Calibration Performed on MTS 55 kip Testing Machine
Comments Do Not allow Load Indicating Needle to Push
Max Load Indicating Needle
Tap all Faces to Settle Readings

[1] Information from the TH-57 A/B NATOPS.
[2] Nicolai, Leland M. Fundamentals of Aircraft Design METS, Inc. San Jose, CA 1954.

3200 lbs

STA\LAT	-7		Centerline		8	
118	1945	585			485	2040
	520	155			130	545
110			1040	1040		
			560	560		
101.5	1230	370			310	1290
	1230	370			310	1290

Table 1: Longitudinal Station vs Lateral Station

6400 lbs

STA\LAT	-7		Centerline		8	
118	3890	1165			970	4080
	1040	310			260	1090
110			2080	2080		
			1125	1125		
101.5	2460	740			615	2585
	2460	740			615	2585

Table 2: Longitudinal Station vs Lateral Station

9600 lbs

STA\LAT	-7		Centerline		8	
118	5000	1750			1455	5000
	1556	465			390	1630
110			3115	3115		
			1685	1685		
101.5	3690	1110			925	3875
	3690	1110			925	3875

Table 3: Longitudinal Station vs Lateral Station

Appendix D

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-2.4285E+03
2	1	-4.6579E+03
3	1	-7.2997E+03
4	1	-1.0306E+04
5	1	-1.3617E+04
6	1	-1.7168E+04
7	1	-2.0886E+04
8	1	-2.4707E+04
9	1	-2.8569E+04
10	1	-2.8569E+04
11	1	-2.4707E+04
12	1	-2.0886E+04
13	1	-1.7168E+04
14	1	-1.3618E+04
15	1	-1.0306E+04
16	1	-7.2997E+03
17	1	-4.6579E+03
18	1	-2.4285E+03
19	1	3.1201E+04
20	1	3.1201E+04
21	1	3.1201E+04
22	1	3.1201E+04

Table D1.2: Principal Stresses

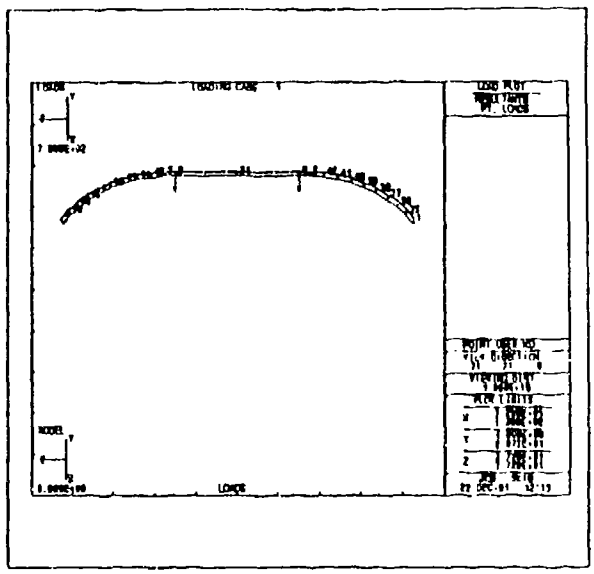


Figure D1.1: Point Location

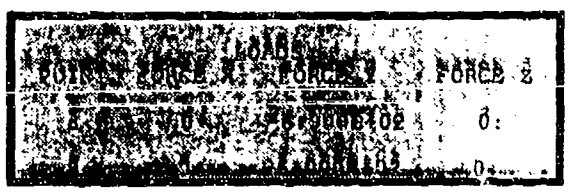


Table D1.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-9.317E-01	7.011E-02	0.000E+00	0.000E+00
3	0.000E+00	-1.309E+00	2.475E-16	4.059E-02	0.000E+00	0.000E+00
5	0.000E+00	-1.309E+00	-2.420E-16	-4.059E-02	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	9.317E-01	-7.011E-02	0.000E+00	0.000E+00
8	0.000E+00	-1.389E+00	2.143E-16	3.523E-02	0.000E+00	0.000E+00
9	0.000E+00	-1.389E+00	-2.088E-16	-3.523E-02	0.000E+00	0.000E+00
35	0.000E+00	-1.078E-01	-7.475E-01	6.985E-02	0.000E+00	0.000E+00
36	0.000E+00	-2.353E-01	-5.782E-01	6.903E-02	0.000E+00	0.000E+00
37	0.000E+00	-3.791E-01	-4.273E-01	6.754E-02	0.000E+00	0.000E+00
38	0.000E+00	-5.352E-01	-2.976E-01	6.529E-02	0.000E+00	0.000E+00
39	0.000E+00	-6.984E-01	-1.911E-01	6.223E-02	0.000E+00	0.000E+00
40	0.000E+00	-8.635E-01	-1.089E-01	5.827E-02	0.000E+00	0.000E+00
41	0.000E+00	-1.024E+00	-5.083E-02	5.337E-02	0.000E+00	0.000E+00
42	0.000E+00	-1.175E+00	-1.550E-02	4.749E-02	0.000E+00	0.000E+00
43	0.000E+00	-1.175E+00	1.550E-02	-4.749E-02	0.000E+00	0.000E+00
44	0.000E+00	-1.024E+00	5.083E-02	-5.337E-02	0.000E+00	0.000E+00
45	0.000E+00	-8.635E-01	1.089E-01	-5.827E-02	0.000E+00	0.000E+00
46	0.000E+00	-6.985E-01	1.911E-01	-6.223E-02	0.000E+00	0.000E+00
47	0.000E+00	-5.352E-01	2.976E-01	-6.529E-02	0.000E+00	0.000E+00
48	0.000E+00	-3.791E-01	4.273E-01	-6.754E-02	0.000E+00	0.000E+00
49	0.000E+00	-2.353E-01	5.782E-01	-6.903E-02	0.000E+00	0.000E+00
50	0.000E+00	-1.078E-01	7.475E-01	-6.985E-02	0.000E+00	0.000E+00
51	0.000E+00	-1.622E+00	0.000E+00	6.397E-10	0.000E+00	0.000E+00

Table D1.3: Deflections

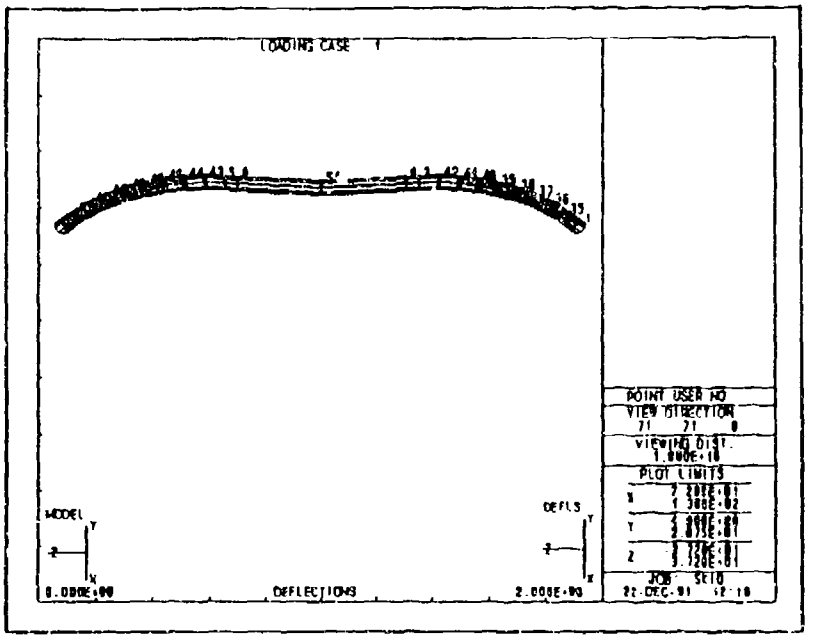


Figure D1.2: Deflected Crosstube

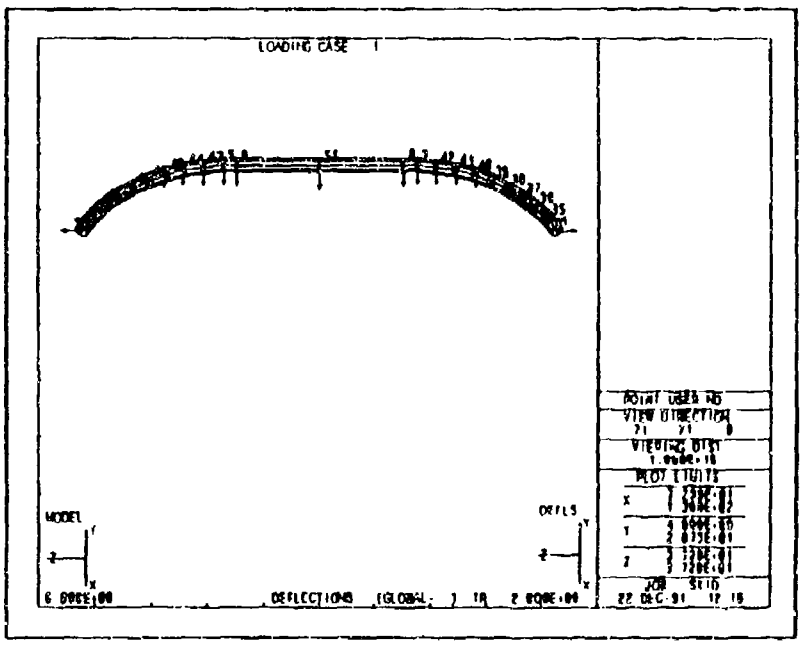


Figure D1.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-3.2364E+03
2	1	-6.2107E+03
3	1	-9.7331E+03
4	1	-1.3741E+04
5	1	-1.8157E+04
6	1	-2.2890E+04
7	1	-2.7848E+04
8	1	-3.2943E+04
9	1	-3.8093E+04
10	1	-3.8093E+04
11	1	-3.2943E+04
12	1	-2.7849E+04
13	1	-2.2890E+04
14	1	-1.8157E+04
15	1	-1.3741E+04
16	1	-9.7332E+03
17	1	-6.2104E+03
18	1	-3.2382E+03
19	1	4.1602E+04
20	1	4.1602E+04
21	1	4.1602E+04
22	1	4.1602E+04

Table D2.2: Principal Stresses

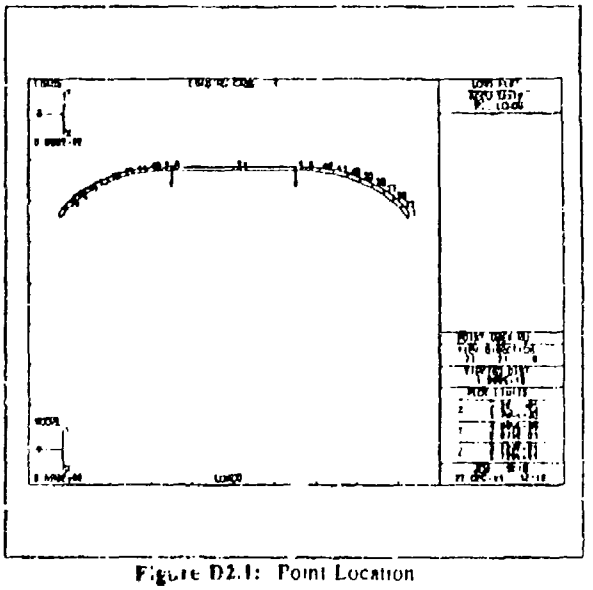


Figure D2.1: Point Location

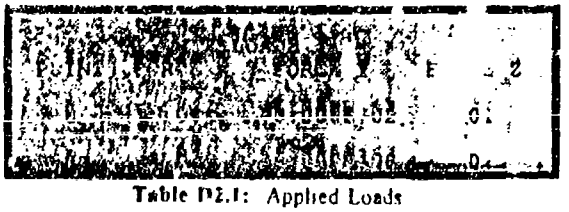


Table D2.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	PX	PY	PZ
1	0.000E+00	0.000E+00	-1.242E+00	9.348E-02	0.000E+00	0.000E+00
3	0.000E+00	-1.745E+00	3.258E-16	5.413E-02	0.000E+00	0.000E+00
5	0.000E+00	-1.745E+00	-3.227E-16	-5.413E-02	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	1.242E+00	-9.348E-02	0.000E+00	0.000E+00
8	0.000E+00	-1.853E+00	2.844E-16	4.698E-02	0.000E+00	0.000E+00
9	0.000E+00	-1.853E+00	-2.784E-16	-4.698E-02	0.000E+00	0.000E+00
35	0.000E+00	-1.438E-01	-9.967E-01	9.314E-02	0.000E+00	0.000E+00
36	0.000E+00	-3.138E-01	-7.710E-01	9.203E-02	0.000E+00	0.000E+00
37	0.000E+00	-5.055E-01	-5.697E-01	9.002E-02	0.000E+00	0.000E+00
38	0.000E+00	-7.136E-01	-3.967E-01	8.706E-02	0.000E+00	0.000E+00
39	0.000E+00	-9.313E-01	-2.547E-01	8.297E-02	0.000E+00	0.000E+00
40	0.000E+00	-1.151E+00	-1.452E-01	7.770E-02	0.000E+00	0.000E+00
41	0.000E+00	-1.366E+00	-6.778E-02	7.116E-02	0.000E+00	0.000E+00
42	0.000E+00	-1.576E+00	-2.066E-02	6.332E-02	0.000E+00	0.000E+00
43	0.000E+00	-1.766E+00	2.066E-02	-6.332E-02	0.000E+00	0.000E+00
44	0.000E+00	-1.966E+00	6.777E-02	-7.116E-02	0.000E+00	0.000E+00
45	0.000E+00	-1.151E+00	1.452E-01	-7.770E-02	0.000E+00	0.000E+00
46	0.000E+00	-9.313E-01	2.547E-01	-8.297E-02	0.000E+00	0.000E+00
47	0.000E+00	-7.136E-01	3.967E-01	-8.706E-02	0.000E+00	0.000E+00
48	0.000E+00	-5.055E-01	5.697E-01	-9.002E-02	0.000E+00	0.000E+00
49	0.000E+00	-3.138E-01	7.710E-01	-9.203E-02	0.000E+00	0.000E+00
50	0.000E+00	-1.438E-01	9.967E-01	-9.314E-02	0.000E+00	0.000E+00
51	0.000E+00	-2.163E+00	0.000E+00	6.579E-10	0.000E+00	0.000E+00

Table D2.3: Deflections

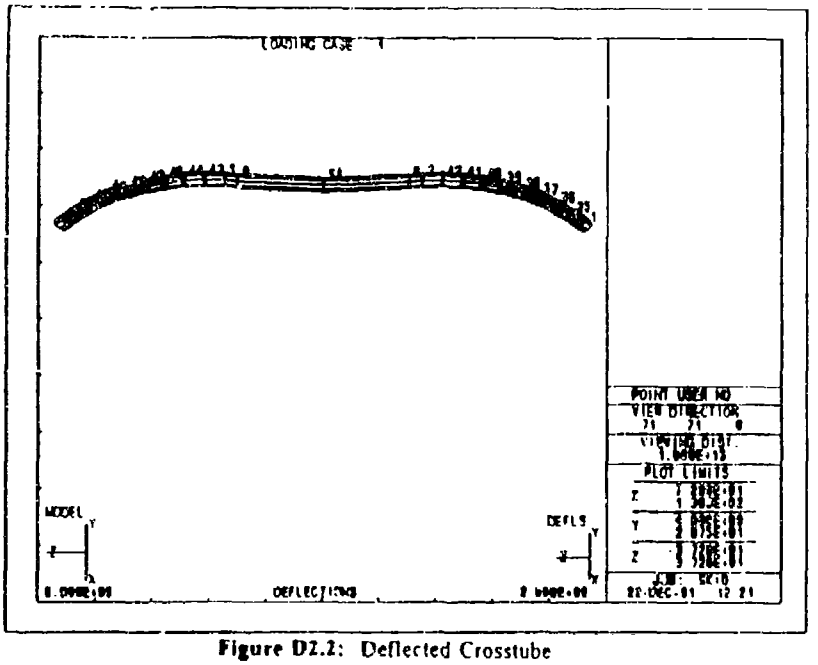


Figure D2.2: Deflected Crosstube

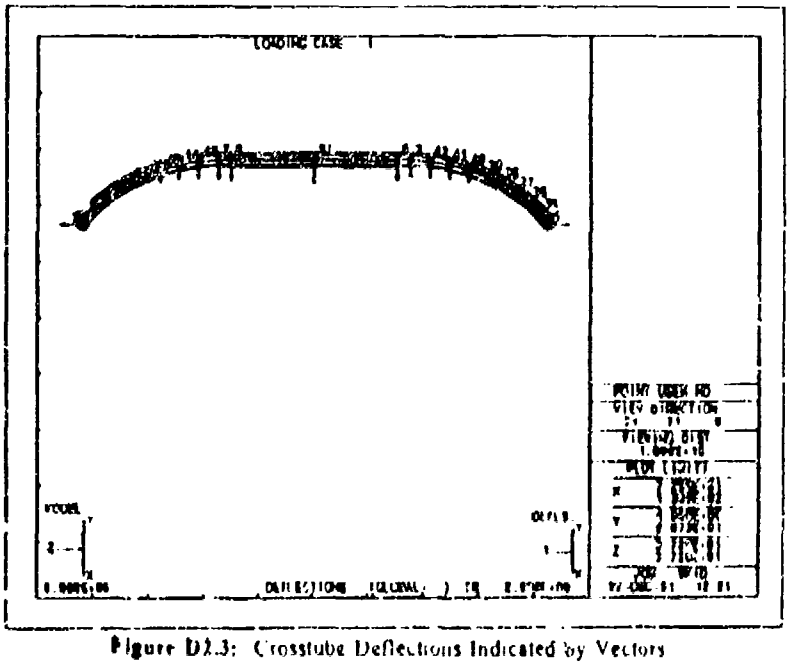


Figure D2.3: Crosstube Deflections Indicated by Vectors

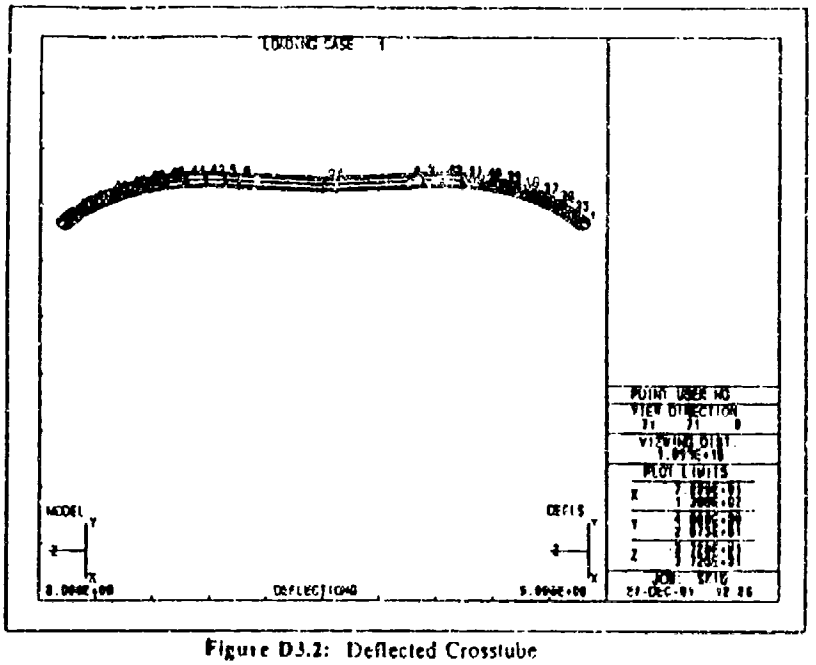


Figure D3.2: Deflected Crosstube

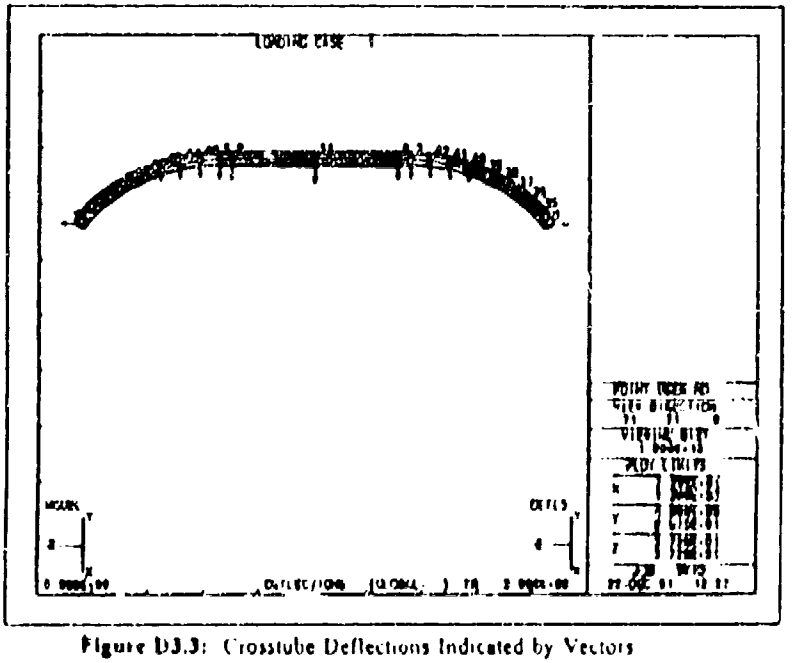


Figure D3.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-4.0476E+03
2	1	-7.7630E+03
3	1	-1.2166E+04
4	1	-1.7176E+04
5	1	-2.2696E+04
6	1	-2.8613E+04
7	1	-3.4811E+04
8	1	-4.1179E+04
9	1	-4.7616E+04
10	1	-4.7616E+04
11	1	-4.1179E+04
12	1	-3.4811E+04
13	1	-2.8613E+04
14	1	-2.2696E+04
15	1	-1.7176E+04
16	1	-1.2166E+04
17	1	-7.7634E+03
18	1	-4.0475E+03
19	1	5.2003E+04
20	1	5.2002E+04
21	1	5.2002E+04
22	1	5.2002E+04

Table D3.2: Principal Stresses

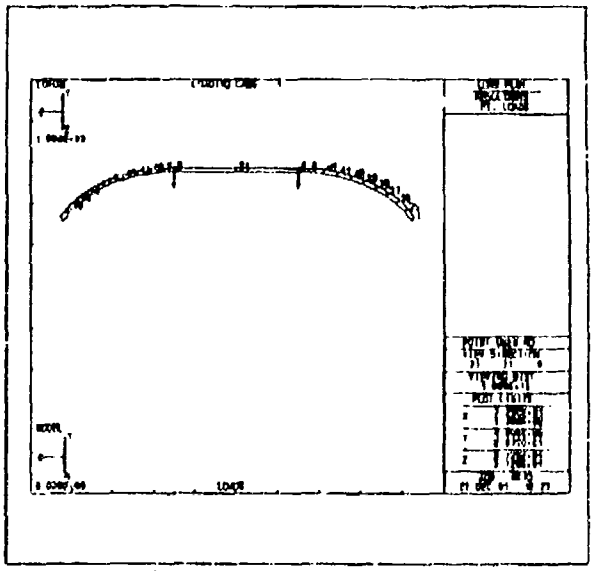


Figure D3.1: Point Location

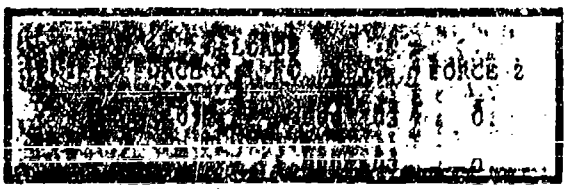


Table D3.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-1.553E+00	1.159E-01	0.000E+00	0.000E+00
3	0.000E+00	-2.102E+00	4.059E-16	6.765E-02	0.000E+00	0.000E+00
5	0.000E+00	-2.102E+00	-4.042E-16	-6.766E-02	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	1.553E+00	-1.169E-01	0.000E+00	0.000E+00
8	0.000E+00	-2.316E+00	3.537E-16	5.872E-02	0.000E+00	0.000E+00
9	0.000E+00	-2.316E+00	-3.497E-16	-5.872E-02	0.000E+00	0.000E+00
35	0.000E+00	-1.797E-01	-1.246E+00	1.164E-01	0.000E+00	0.000E+00
36	0.000E+00	-3.922E-01	-9.637E-01	1.150E-01	0.000E+00	0.000E+00
37	0.000E+00	-6.319E-01	-7.122E-01	1.126E-01	0.000E+00	0.000E+00
38	0.000E+00	-8.919E-01	-4.959E-01	1.088E-01	0.000E+00	0.000E+00
39	0.000E+00	-1.164E+00	-3.184E-01	1.037E-01	0.000E+00	0.000E+00
40	0.000E+00	-1.439E+00	-1.814E-01	9.712E-02	0.000E+00	0.000E+00
41	0.000E+00	-1.707E+00	-8.122E-02	8.095E-02	0.000E+00	0.000E+00
42	0.000E+00	-1.958E+00	-2.563E-02	7.915E-02	0.000E+00	0.000E+00
43	0.000E+00	-1.956E+00	2.563E-02	-7.915E-02	0.000E+00	0.000E+00
44	0.000E+00	-1.707E+00	8.472E-02	-8.995E-02	0.000E+00	0.000E+00
45	0.000E+00	-1.439E+00	1.814E-01	-9.712E-02	0.000E+00	0.000E+00
46	0.000E+00	-1.164E+00	3.184E-01	-1.037E-01	0.000E+00	0.000E+00
47	0.000E+00	-8.919E-01	4.959E-01	-1.088E-01	0.000E+00	0.000E+00
48	0.000E+00	-6.319E-01	7.122E-01	-1.126E-01	0.000E+00	0.000E+00
49	0.000E+00	-3.922E-01	9.637E-01	1.150E-01	0.000E+00	0.000E+00
50	0.000E+00	-1.797E-01	1.246E+00	-1.164E-01	0.000E+00	0.000E+00
51	0.000E+00	-2.703E+00	0.000E+00	1.066E-09	0.000E+00	0.000E+00

Table D3.3: Deflections

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-4.8569E+03
2	1	-9.3158E+03
3	1	-1.4599E+04
4	1	-2.0612E+04
5	1	-2.7235E+04
6	1	-3.4336E+04
7	1	-4.1773E+04
8	1	-4.9414E+04
9	1	-5.7138E+04
10	1	-5.7139E+04
11	1	-4.9414E+04
12	1	-4.1773E+04
13	1	-3.4336E+04
14	1	-2.7235E+04
15	1	-2.0612E+04
16	1	-1.4599E+04
17	1	-9.3158E+03
18	1	-4.8570E+03
19	1	6.2402E+04
20	1	6.2403E+04
21	1	6.2402E+04
22	1	6.2402E+04

Table D4.2: Principal Stresses

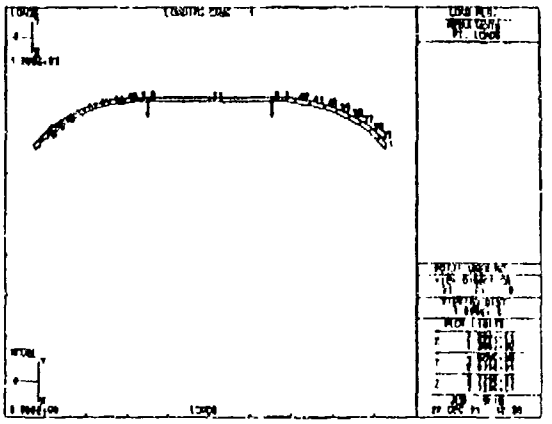


Figure D4.1: Point Location

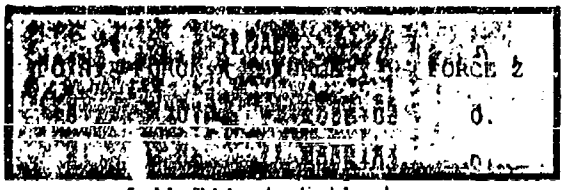


Table D4.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-1.863E+00	1.402E-01	0.000E+00	0.000E+00
3	0.000E+00	-2.618E+00	4.949E-16	8.119E-02	0.000E+00	0.000E+00
5	0.000E+00	-2.618E+00	-4.840E-16	-8.119E-02	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	1.863E+00	-1.402E-01	0.000E+00	0.000E+00
8	0.000E+00	-2.779E+00	4.236E-16	7.047E-02	0.000E+00	0.000E+00
9	0.000E+00	-2.779E+00	-4.176E-16	-7.047E-02	0.000E+00	0.000E+00
35	0.000E+00	-2.157E-01	-1.495E+00	1.397E-01	0.000E+00	0.000E+00
36	0.000E+00	-4.706E-01	-1.156E+00	1.381E-01	0.000E+00	0.000E+00
37	0.000E+00	-7.583E-01	-8.546E-01	1.351E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.070E+00	-5.951E-01	1.306E-01	0.000E+00	0.000E+00
39	0.000E+00	-1.397E+00	-3.821E-01	1.245E-01	0.000E+00	0.000E+00
40	0.000E+00	-1.727E+00	-2.177E-01	1.165E-01	0.000E+00	0.000E+00
41	0.000E+00	-2.048E+00	-1.017E-01	1.067E-01	0.000E+00	0.000E+00
42	0.000E+00	-2.349E+00	-3.099E-02	9.498E-02	0.000E+00	0.000E+00
43	0.000E+00	-2.349E+00	3.099E-02	-9.498E-02	0.000E+00	0.000E+00
44	0.000E+00	-2.048E+00	1.017E-01	-1.067E-01	0.000E+00	0.000E+00
45	0.000E+00	-1.727E+00	2.177E-01	-1.165E-01	0.000E+00	0.000E+00
46	0.000E+00	-1.397E+00	3.821E-01	-1.245E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.070E+00	5.951E-01	-1.306E-01	0.000E+00	0.000E+00
48	0.000E+00	-7.583E-01	8.546E-01	-1.351E-01	0.000E+00	0.000E+00
49	0.000E+00	-4.706E-01	1.156E+00	-1.381E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.157E-01	1.495E+00	-1.397E-01	0.000E+00	0.000E+00
51	0.000E+00	-3.244E+00	0.000E+00	1.279E-09	0.000E+00	0.000E+00

Table D4.3: Deflections

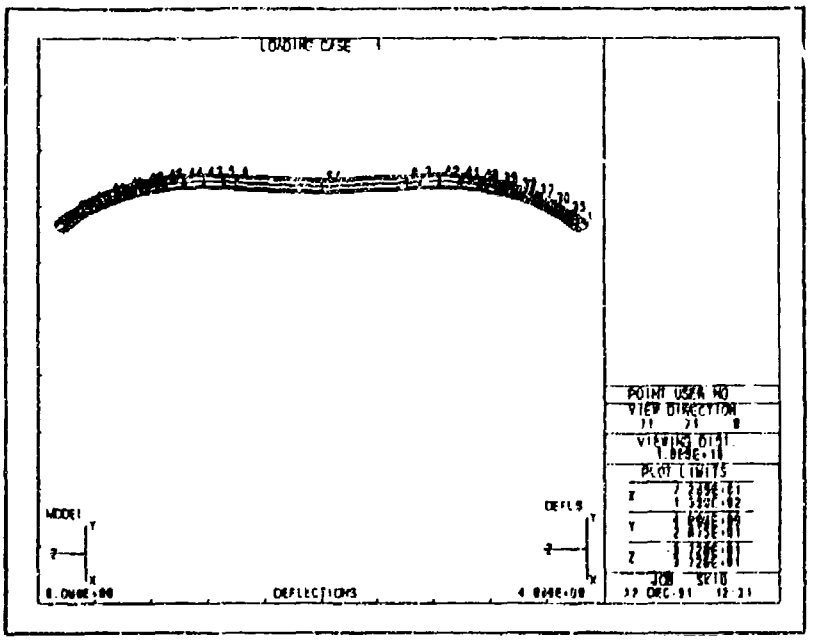


Figure D4.2: Deflected Crosstube

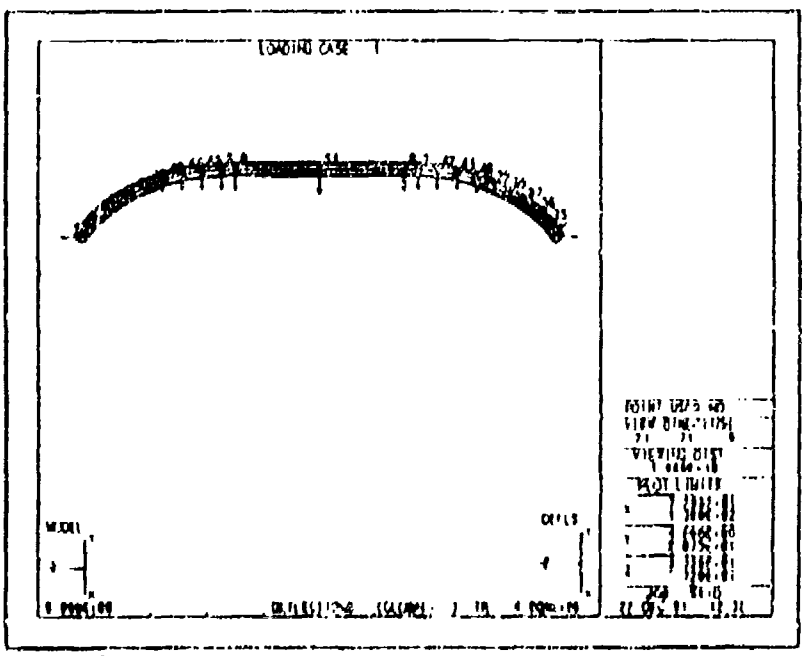


Figure D4.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S1
1	1	-5.2620E+03
2	1	-1.0092E+04
3	1	-1.5816E+04
4	1	-2.2329E+04
5	1	-2.9505E+04
6	1	-3.7196E+04
7	1	-4.5255E+04
8	1	-5.3531E+04
9	1	-6.1901E+04
10	1	-6.1900E+04
11	1	-5.3532E+04
12	1	-4.5255E+04
13	1	-3.7197E+04
14	1	-2.9505E+04
15	1	-2.2329E+04
16	1	-1.5816E+04
17	1	-1.0092E+04
18	1	-5.2615E+03
19	1	6.7602E+04
20	1	6.7603E+04
21	1	6.7603E+04
22	1	6.7603E+04

Table D5.2: Principal Stresses

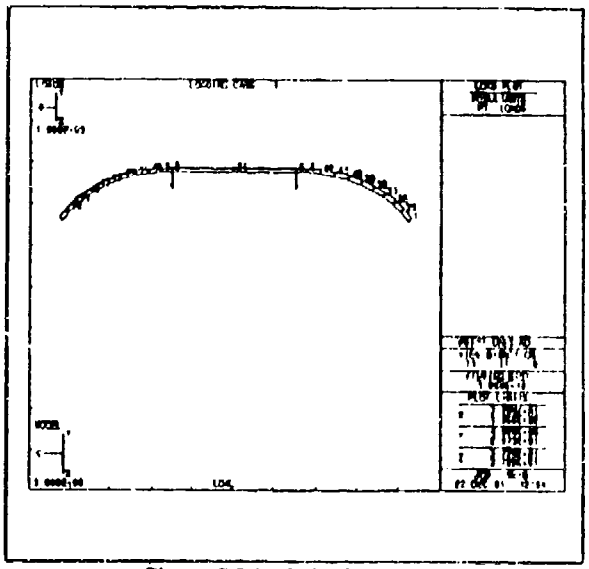


Figure D5.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
0	0.	-1.300E+03	0.
0	0.	-1.300E+03	0.

Table D5.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-2.019E+00	1.519E-01	0.000E+00	0.000E+00
3	0.000E+00	-2.836E+00	5.301E-16	8.795E-02	0.000E+00	0.000E+00
5	0.000E+00	-2.836E+00	-5.274E-16	-8.795E-02	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	2.019E+00	-1.519E-01	0.000E+00	0.000E+00
8	0.000E+00	-3.010E+00	4.608E-16	7.634E-02	0.000E+00	0.000E+00
9	0.000E+00	-3.010E+00	-4.559E-16	-7.634E-02	0.000E+00	0.000E+00
35	0.000E+00	-2.336E-01	-1.620E+00	1.513E-01	0.000E+00	0.000E+00
36	0.000E+00	-5.098E-01	-1.252E+00	1.496E-01	0.000E+00	0.000E+00
37	0.000E+00	-8.215E-01	-9.256E-01	1.463E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.160E+00	-6.447E-01	1.415E-01	0.000E+00	0.000E+00
39	0.000E+00	-1.513E+00	-4.140E-01	1.348E-01	0.000E+00	0.000E+00
40	0.000E+00	-1.871E+00	-2.359E-01	1.263E-01	0.000E+00	0.000E+00
41	0.000E+00	-2.219E+00	-1.101E-01	1.156E-01	0.000E+00	0.000E+00
42	0.000E+00	-2.545E+00	-3.357E-02	1.029E-01	0.000E+00	0.000E+00
43	0.000E+00	-2.545E+00	3.357E-02	-1.029E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.219E+00	1.101E-01	-1.156E-01	0.000E+00	0.000E+00
45	0.000E+00	-1.871E+00	2.359E-01	-1.263E-01	0.000E+00	0.000E+00
46	0.000E+00	-1.513E+00	4.140E-01	-1.348E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.160E+00	6.447E-01	-1.415E-01	0.000E+00	0.000E+00
48	0.000E+00	-8.215E-01	9.256E-01	-1.463E-01	0.000E+00	0.000E+00
49	0.000E+00	-5.098E-01	1.252E+00	-1.496E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.336E-01	1.620E+00	-1.513E-01	0.000E+00	0.000E+00
51	0.000E+00	-3.514E+00	0.000E+00	1.386E-09	0.000E+00	0.000E+00

Table D5.3: Deflections

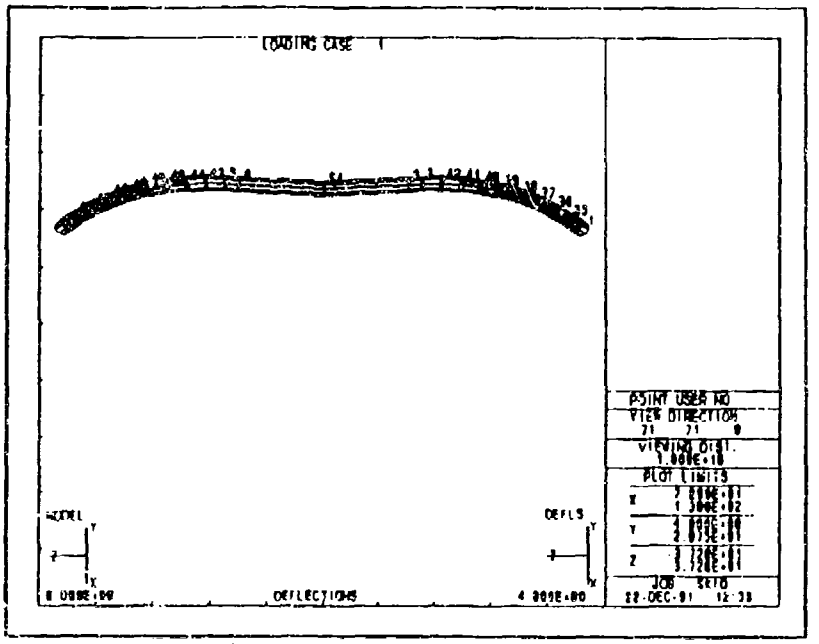


Figure D5.2: Deflected Crosstube

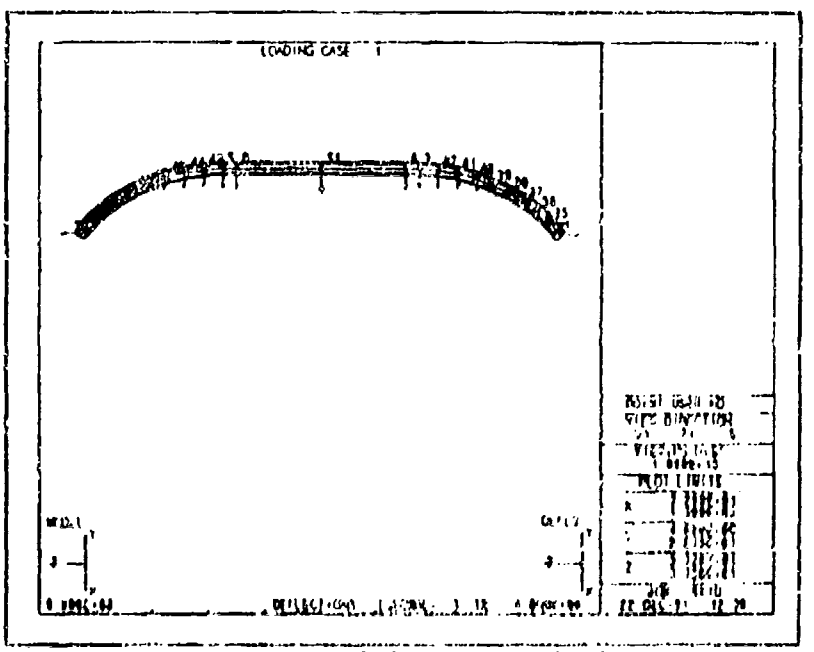


Figure D5.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-5.4644E+03
2	1	-1.0480E+04
3	1	-1.6425E+04
4	1	-2.3188E+04
5	1	-3.0639E+04
6	1	-3.8627E+04
7	1	-4.6995E+04
8	1	-5.5592E+04
9	1	-6.4282E+04
10	1	-6.4282E+04
11	1	-5.5591E+04
12	1	-4.6995E+04
13	1	-3.8628E+04
14	1	-3.0640E+04
15	1	-2.3188E+04
16	1	-1.6424E+04
17	1	-1.0480E+04
18	1	-5.4641E+03
19	1	7.0203E+04
20	1	7.0203E+04
21	1	7.0203E+04
22	1	7.0203E+04

Table D6.2: Principal Stresses

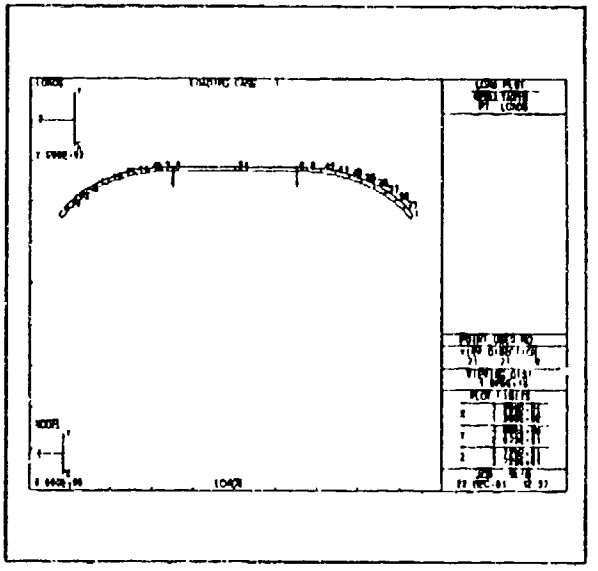


Figure D6.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
8	0.	-1.350E+03	0.
9	0.	-1.350E+03	0.

Table D6.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-2.096E+00	1.578E-01	0.000E+00	0.000E+00
3	0.000E+00	-2.945E+00	5.467E-16	9.134E-02	0.000E+00	0.000E+00
5	0.000E+00	-2.945E+00	-5.447E-16	-9.134E-02	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	2.096E+00	-1.578E-01	0.000E+00	0.000E+00
8	0.000E+00	-3.126E+00	4.769E-16	7.928E-02	0.000E+00	0.000E+00
9	0.000E+00	-3.126E+00	-4.699E-16	-7.928E-02	0.000E+00	0.000E+00
35	0.000E+00	-2.426E-01	-1.682E+00	1.572E-01	0.000E+00	0.000E+00
36	0.000E+00	-5.295E-01	-1.301E+00	1.553E-01	0.000E+00	0.000E+00
37	0.000E+00	-8.531E-01	-9.614E-01	1.520E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.204E+00	-6.695E-01	1.469E-01	0.000E+00	0.000E+00
39	0.000E+00	-1.572E+00	-4.299E-01	1.400E-01	0.000E+00	0.000E+00
40	0.000E+00	-1.943E+00	-2.449E-01	1.311E-01	0.000E+00	0.000E+00
41	0.000E+00	-2.305E+00	-1.144E-01	1.201E-01	0.000E+00	0.000E+00
42	0.000E+00	-2.643E+00	-3.487E-02	1.068E-01	0.000E+00	0.000E+00
43	0.000E+00	-2.643E+00	3.487E-02	-1.068E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.305E+00	1.144E-01	-1.201E-01	0.000E+00	0.000E+00
45	0.000E+00	-1.943E+00	2.449E-01	-1.311E-01	0.000E+00	0.000E+00
46	0.000E+00	-1.572E+00	4.299E-01	-1.400E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.204E+00	6.695E-01	-1.469E-01	0.000E+00	0.000E+00
48	0.000E+00	-8.531E-01	9.614E-01	-1.520E-01	0.000E+00	0.000E+00
49	0.000E+00	-5.295E-01	1.301E+00	-1.553E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.426E-01	1.682E+00	-1.572E-01	0.000E+00	0.000E+00
51	0.000E+00	-3.650E+00	0.000E+00	1.439E-09	0.000E+00	0.000E+00

Table D6.3: Deflections

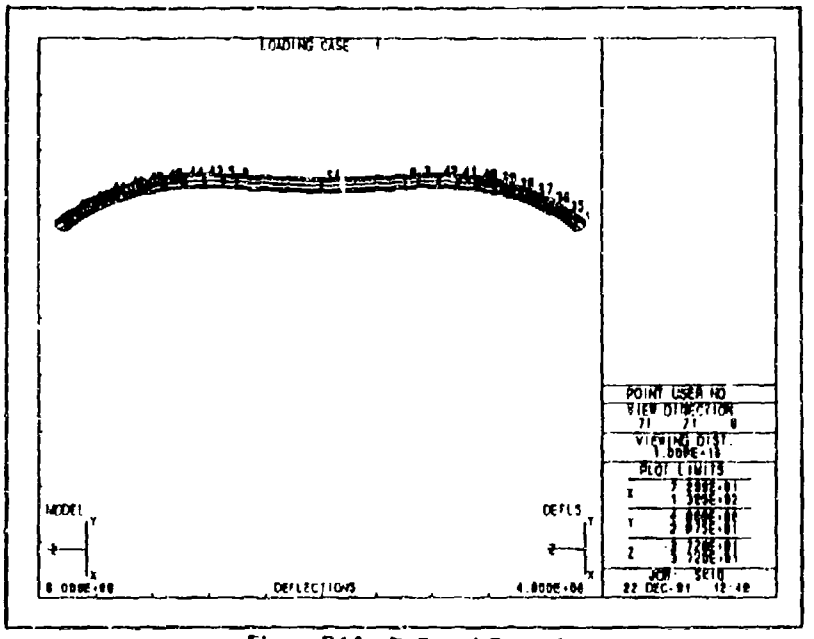


Figure D6.2: Deflected Crosstube

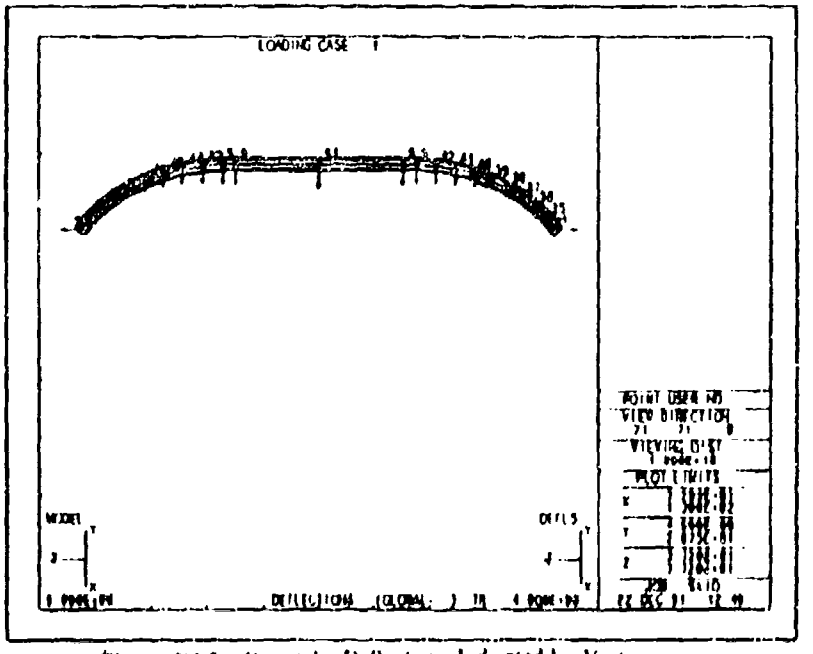


Figure D6.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-5.6666E+03
2	1	-1.0868E+04
3	1	-1.7033E+04
4	1	-2.4048E+04
5	1	-3.1774E+04
6	1	-4.0058E+04
7	1	-4.8735E+04
8	1	-5.7650E+04
9	1	-6.6663E+04
10	1	-6.6662E+04
11	1	-5.7650E+04
12	1	-4.8735E+04
13	1	-4.0059E+04
14	1	-3.1774E+04
15	1	-2.4047E+04
16	1	-1.7033E+04
17	1	-1.0868E+04
18	1	-5.6665E+03
19	1	7.2803E+04
20	1	7.2803E+04
21	1	7.2803E+04
22	1	7.2803E+04

Table D7.2: Principal Stresses

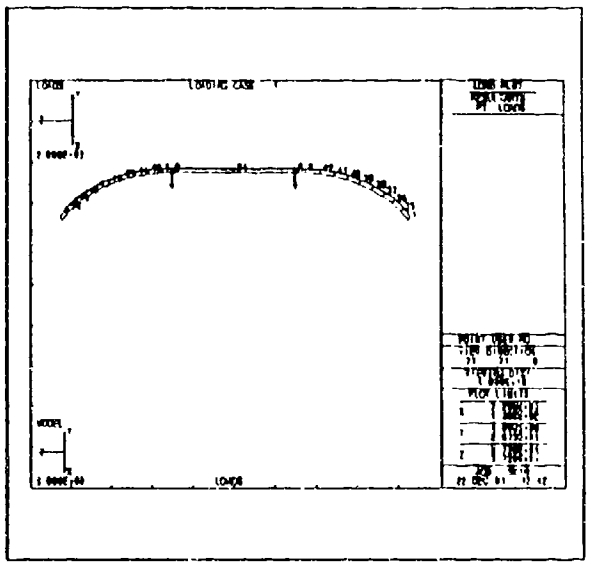


Figure D7.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
8	0.	-1.400E+03	0.
9	0.	-1.400E+03	0.

Table D7.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-2.174E+00	1.636E-01	0.000E+00	0.000E+00
3	0.000E+00	-3.054E+00	5.729E-16	9.472E-02	0.000E+00	0.000E+00
5	0.000E+00	-3.054E+00	-5.690E-16	-9.472E-02	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	2.174E+00	-1.636E-01	0.000E+00	0.000E+00
8	0.000E+00	-3.242E+00	4.984E-16	8.221E-02	0.000E+00	0.000E+00
9	0.000E+00	-3.242E+00	-4.909E-16	-8.221E-02	0.000E+00	0.000E+00
35	0.000E+00	-2.516E-01	-1.744E+00	1.630E-01	0.000E+00	0.000E+00
36	0.000E+00	-5.491E-01	-1.349E+00	1.611E-01	0.000E+00	0.000E+00
37	0.000E+00	-8.847E-01	-9.970E-01	1.576E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.249E+00	-6.943E-01	1.524E-01	0.000E+00	0.000E+00
39	0.000E+00	-1.630E+00	-4.458E-01	1.452E-01	0.000E+00	0.000E+00
40	0.000E+00	-2.015E+00	-2.540E-01	1.360E-01	0.000E+00	0.000E+00
41	0.000E+00	-2.390E+00	-1.186E-01	1.245E-01	0.000E+00	0.000E+00
42	0.000E+00	-2.741E+00	-3.616E-02	1.108E-01	0.000E+00	0.000E+00
43	0.000E+00	-2.741E+00	3.616E-02	-1.108E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.390E+00	1.186E-01	-1.245E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.015E+00	2.540E-01	-1.360E-01	0.000E+00	0.000E+00
46	0.000E+00	-1.630E+00	4.458E-01	-1.452E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.249E+00	6.943E-01	-1.524E-01	0.000E+00	0.000E+00
48	0.000E+00	-8.847E-01	9.970E-01	-1.576E-01	0.000E+00	0.000E+00
49	0.000E+00	-5.491E-01	1.349E+00	-1.611E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.516E-01	1.744E+00	-1.630E-01	0.000E+00	0.000E+00
51	0.000E+00	-3.785E+00	0.000E+00	1.493E-09	0.000E+00	0.000E+00

Table D7.3: Deflections

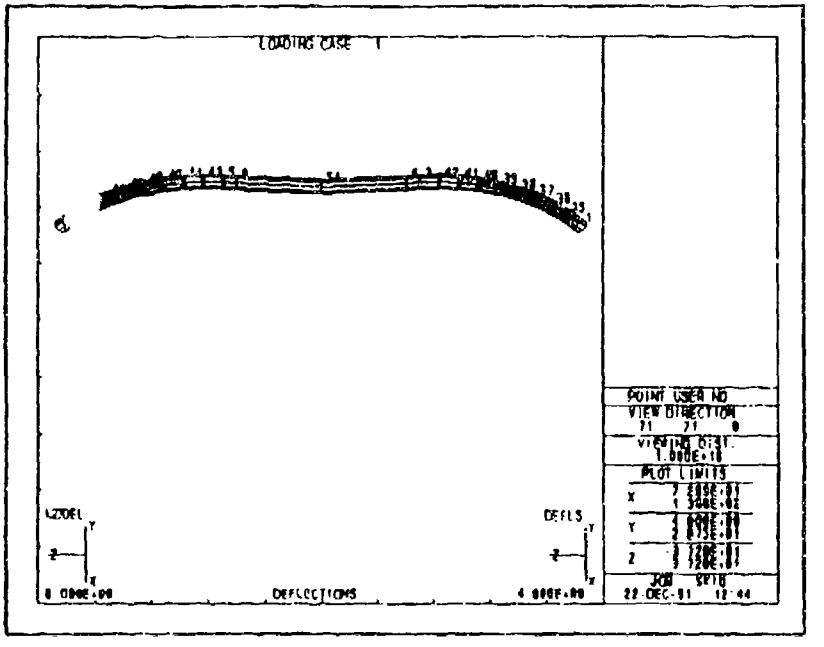


Figure D7.2: Deflected Crosstube

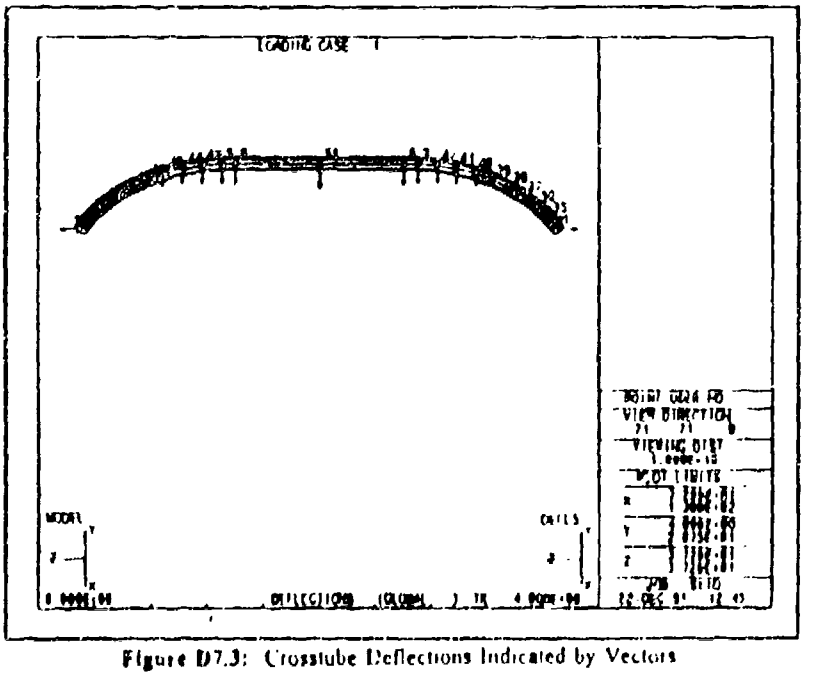


Figure D7.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-5.8696E+03
2	1	-1.1256E+04
3	1	-1.7641E+04
4	1	-2.4906E+04
5	1	-3.2910E+04
6	1	-4.1489E+04
7	1	-5.0476E+04
8	1	-5.9708E+04
9	1	-6.9043E+04
10	1	-6.9043E+04
11	1	-5.9708E+04
12	1	-5.0476E+04
13	1	-4.1489E+04
14	1	-3.2909E+04
15	1	-2.4907E+04
16	1	-1.7641E+04
17	1	-1.1257E+04
18	1	-5.8690E+03
19	1	7.5403E+04
20	1	7.5403E+04
21	1	7.5403E+04
22	1	7.5404E+04

Table D8.2: Principal Stresses

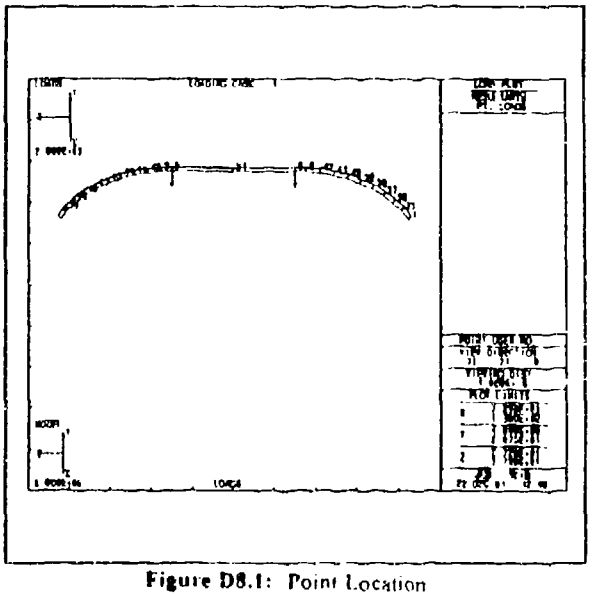


Figure D8.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
8	0.	-1.450E+03	0.
9	0.	-1.450E+03	0.

Table D8.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-2.252E+00	1.694E-01	0.000E+00	0.000E+00
3	0.000E+00	-3.164E+00	5.916E-16	9.810E-02	0.000E+00	0.000E+00
5	0.000E+00	-3.164E+00	-5.846E-16	-9.810E-02	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	2.252E+00	-1.694E-01	0.000E+00	0.000E+00
8	0.000E+00	-3.358E+00	5.170E-16	8.515E-02	0.000E+00	0.000E+00
9	0.000E+00	-3.358E+00	-5.044E-16	-8.515E-02	0.000E+00	0.000E+00
35	0.000E+00	-2.606E-01	-1.806E+00	1.688E-01	0.000E+00	0.000E+00
36	0.000E+00	-5.687E-01	-1.397E+00	1.668E-01	0.000E+00	0.000E+00
37	0.000E+00	-9.163E-01	-1.033E+00	1.632E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.293E+00	-7.191E-01	1.578E-01	0.000E+00	0.000E+00
39	0.000E+00	-1.688E+00	-4.617E-01	1.504E-01	0.000E+00	0.000E+00
40	0.000E+00	-2.087E+00	-2.631E-01	1.408E-01	0.000E+00	0.000E+00
41	0.000E+00	-2.475E+00	-1.228E-01	1.290E-01	0.000E+00	0.000E+00
42	0.000E+00	-2.839E+00	-3.745E-02	1.148E-01	0.000E+00	0.000E+00
43	0.000E+00	-2.839E+00	3.745E-02	-1.148E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.475E+00	1.228E-01	-1.290E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.087E+00	2.631E-01	-1.408E-01	0.000E+00	0.000E+00
46	0.000E+00	-1.688E+00	4.617E-01	-1.504E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.293E+00	7.191E-01	-1.578E-01	0.000E+00	0.000E+00
48	0.000E+00	-9.163E-01	1.033E+00	-1.632E-01	0.000E+00	0.000E+00
49	0.000E+00	-5.687E-01	1.397E+00	-1.668E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.606E-01	1.806E+00	-1.688E-01	0.000E+00	0.000E+00
51	0.000E+00	-3.920E+00	0.000E+00	1.546E-02	0.000E+00	0.000E+00

Table D8.3: Deflections

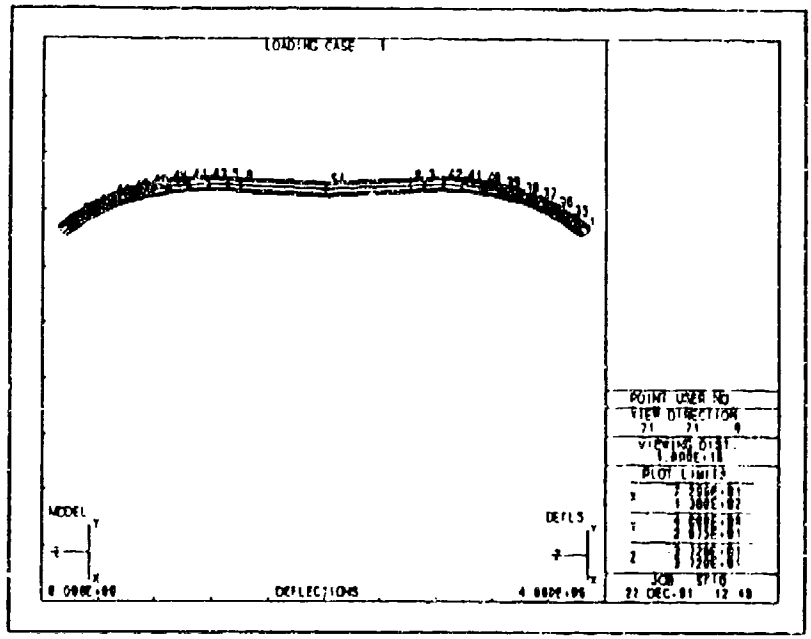


Figure D8.2: Deflected Crosstube

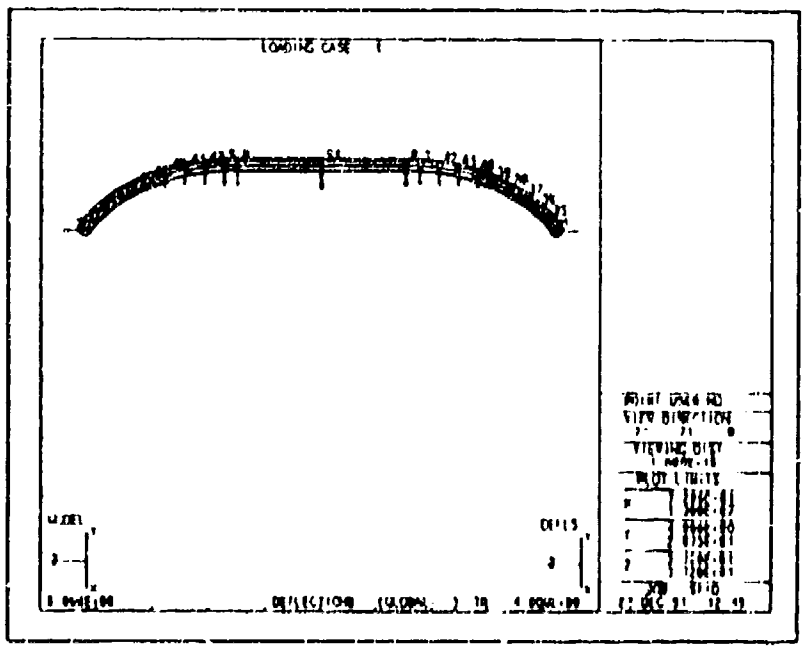


Figure D8.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-6.0715E+03
2	1	-1.1644E+04
3	1	-1.8249E+04
4	1	-2.5765E+04
5	1	-3.4044E+04
6	1	-4.2019E+04
7	1	-5.2216E+04
8	1	-6.1767E+04
9	1	-7.1425E+04
10	1	-7.1424E+04
11	1	-6.1768E+04
12	1	-5.2217E+04
13	1	-4.2919E+04
14	1	-3.4044E+04
15	1	-2.5764E+04
16	1	-1.8249E+04
17	1	-1.1645E+04
18	1	-6.0717E+03
19	1	7.8004E+04
20	1	7.8003E+04
21	1	7.8003E+04
22	1	7.8003E+04

Table D9.2: Principal Stresses

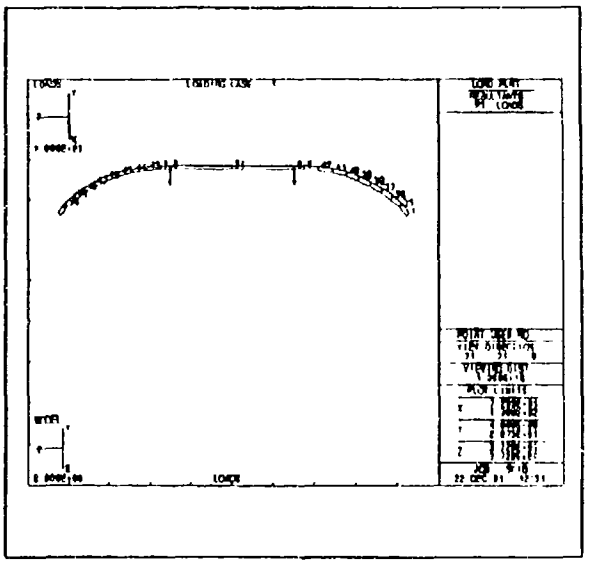


Figure D9.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
8	0.	-1.300E+03	0.
9	0.	-1.500E+03	0.

Table D9.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-2.329E+00	1.753E-01	0.000E+00	0.000E+00
3	0.000E+00	-3.273E+00	6.176E-16	1.015E-01	0.000E+00	0.000E+00
5	0.000E+00	-3.273E+00	-6.037E-16	-1.015E-01	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	2.329E+00	-1.753E-01	0.000E+00	0.000E+00
8	0.000E+00	-3.474E+00	5.360E-16	8.808E-02	0.000E+00	0.000E+00
9	0.000E+00	-3.474E+00	-5.208E-16	-8.808E-02	0.000E+00	0.000E+00
35	0.000E+00	-2.696E-01	-1.869E+00	1.746E-01	0.000E+00	0.000E+00
36	0.000E+00	-5.883E-01	-1.446E+00	1.726E-01	0.000E+00	0.000E+00
37	0.000E+00	-9.479E-01	-1.068E+00	1.688E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.338E+00	-7.439E-01	1.632E-01	0.000E+00	0.000E+00
39	0.000E+00	-1.746E+00	-4.776E-01	1.556E-01	0.000E+00	0.000E+00
40	0.000E+00	-2.159E+00	-2.722E-01	1.457E-01	0.000E+00	0.000E+00
41	0.000E+00	-2.561E+00	-1.271E-01	1.334E-01	0.000E+00	0.000E+00
42	0.000E+00	-2.937E+00	-3.874E-02	1.187E-01	0.000E+00	0.000E+00
43	0.000E+00	-2.937E+00	3.874E-02	-1.187E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.561E+00	1.271E-01	-1.334E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.159E+00	2.722E-01	-1.457E-01	0.000E+00	0.000E+00
46	0.000E+00	-1.746E+00	4.776E-01	-1.556E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.338E+00	7.439E-01	-1.632E-01	0.000E+00	0.000E+00
48	0.000E+00	-9.479E-01	1.068E+00	-1.688E-01	0.000E+00	0.000E+00
49	0.000E+00	-5.883E-01	1.446E+00	-1.726E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.696E-01	1.869E+00	-1.746E-01	0.000E+00	0.000E+00
51	0.000E+00	-4.055E+00	0.000E+00	1.599E-09	0.000E+00	0.000E+00

Table D9.3: Deflections

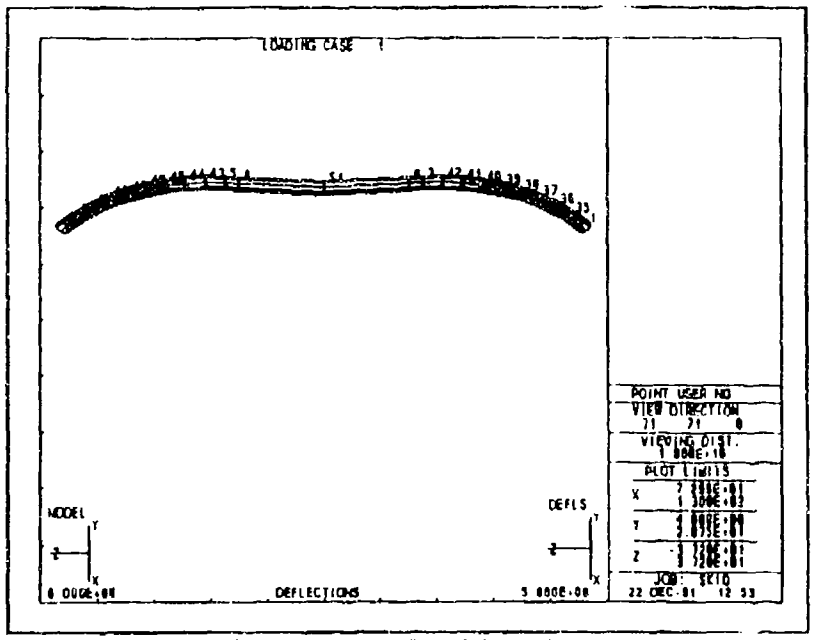


Figure D9.2: Deflected Crosstube

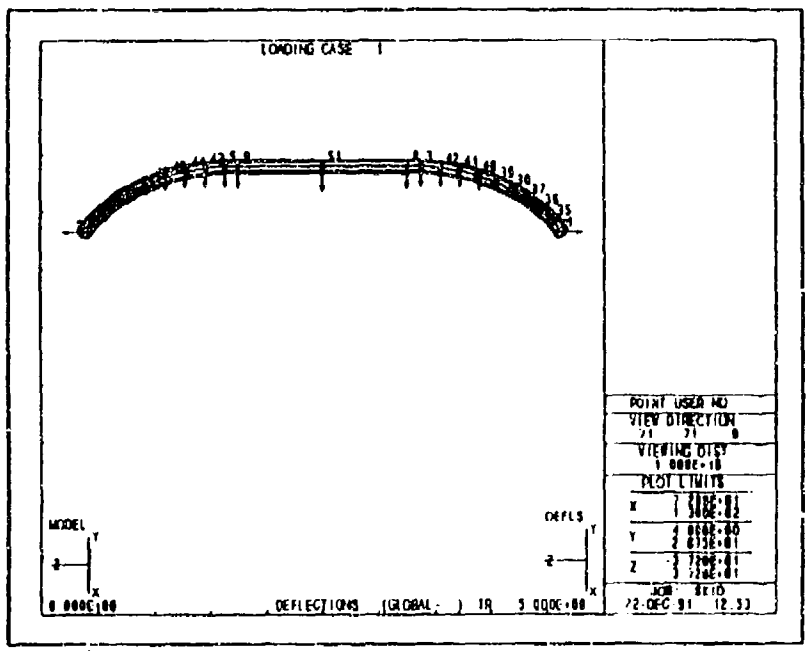


Figure D9.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-5.2739E+03
2	1	-1.2032E+04
3	1	-1.8857E+04
4	1	-2.5623E+04
5	1	-3.5179E+04
6	1	-4.4351E+04
7	1	-5.3957E+04
8	1	-6.3826E+04
9	1	-7.3806E+04
10	1	-7.3805E+04
11	1	-6.3827E+04
12	1	-5.3957E+04
13	1	-4.4350E+04
14	1	-3.5179E+04
15	1	-2.5623E+04
16	1	-1.8858E+04
17	1	-1.2033E+04
18	1	-6.2739E+03
19	1	8.0602E+04
20	1	8.0603E+04
21	1	8.0603E+04
22	1	8.0604E+04

Table D10.2: Principal Stresses

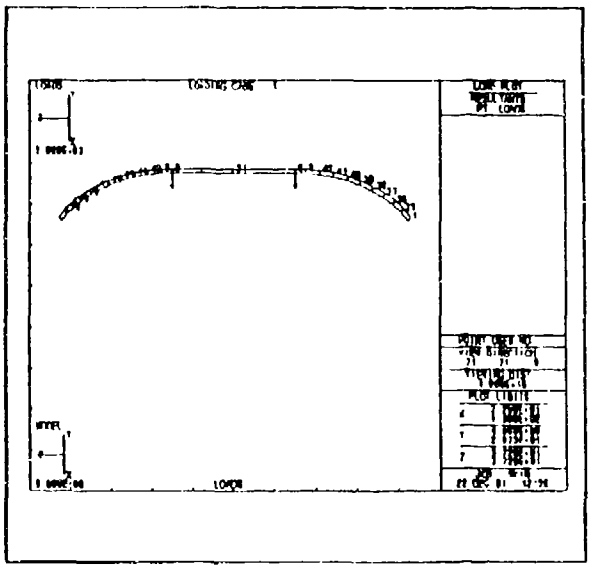


Figure D10.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
8	0.	-1.550E+03	0.
9	0.	-1.550E+03	0.

Table D10.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-2.407E+00	1.811E-01	0.000E+00	0.000E+00
3	0.000E+00	-3.382E+00	6.326E-16	1.049E-01	0.000E+00	0.000E+00
5	0.000E+00	-3.382E+00	-6.245E-16	-1.049E-01	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	2.407E+00	-1.811E-01	0.000E+00	0.000E+00
8	0.000E+00	-3.589E+00	5.478E-16	9.102E-02	0.000E+00	0.000E+00
9	0.000E+00	-3.589E+00	-5.388E-16	-9.102E-02	0.000E+00	0.000E+00
35	0.000E+00	-2.786E-01	-1.931E+00	1.805E-01	0.000E+00	0.000E+00
36	0.000E+00	-6.079E-01	-1.494E+00	1.783E-01	0.000E+00	0.000E+00
37	0.000E+00	-9.795E-01	-1.104E+00	1.745E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.383E+00	-7.687E-01	1.687E-01	0.000E+00	0.000E+00
39	0.000E+00	-1.804E+00	-4.936E-01	1.608E-01	0.000E+00	0.000E+00
40	0.000E+00	-2.231E+00	-2.812E-01	1.505E-01	0.000E+00	0.000E+00
41	0.000E+00	-2.646E+00	-1.313E-01	1.379E-01	0.000E+00	0.000E+00
42	0.000E+00	-3.035E+00	-4.003E-02	1.227E-01	0.000E+00	0.000E+00
43	0.000E+00	-3.035E+00	4.003E-02	-1.227E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.646E+00	1.313E-01	-1.379E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.231E+00	2.812E-01	-1.505E-01	0.000E+00	0.000E+00
46	0.000E+00	-1.804E+00	4.936E-01	-1.608E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.383E+00	7.687E-01	-1.687E-01	0.000E+00	0.000E+00
48	0.000E+00	-9.795E-01	1.104E+00	-1.745E-01	0.000E+00	0.000E+00
49	0.000E+00	-6.079E-01	1.494E+00	-1.783E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.786E-01	1.931E+00	-1.805E-01	0.000E+00	0.000E+00
51	0.000E+00	-4.190E+00	0.000E+00	1.653E-09	0.000E+00	0.000E+00

Table D10.3: Deflections

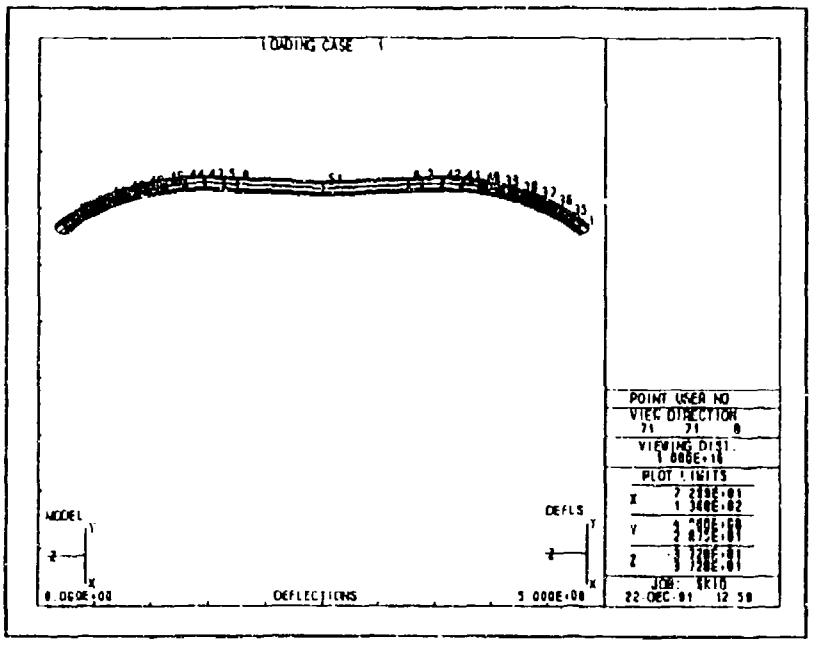


Figure D10.2: Deflected Crosstube

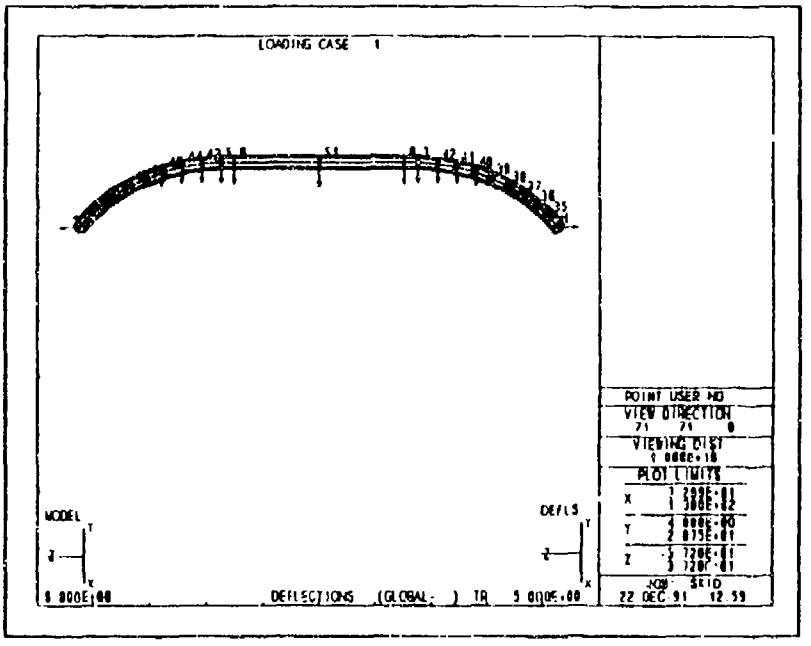


Figure D10.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-6.4767E+03
2	1	-1.2421E+04
3	1	-1.9466E+04
4	1	-2.7482E+04
5	1	-3.6314E+04
6	1	-4.5781E+04
7	1	-5.5696E+04
8	1	-6.5886E+04
9	1	-7.6186E+04
10	1	-7.6185E+04
11	1	-6.5885E+04
12	1	-5.5697E+04
13	1	-4.5781E+04
14	1	-3.6313E+04
15	1	-2.7482E+04
16	1	-1.9466E+04
17	1	-1.2421E+04
18	1	-6.4764E+03
19	1	8.3204E+04
20	1	8.3203E+04
21	1	8.3203E+04
22	1	8.3204E+04

Table D11.2: Principal Stresses

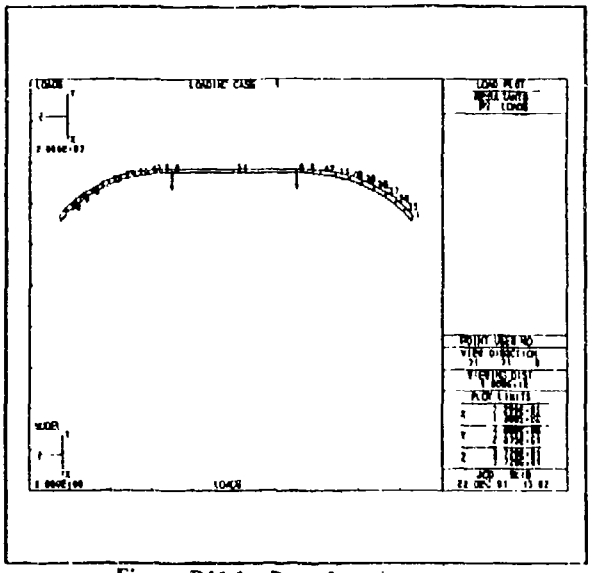


Figure D11.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
8	0.	-1.600E+03	0.
9	0.	-1.600E+03	0.

Table D11.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-2.485E+00	1.870E-01	0.000E+00	0.000E+00
3	0.000E+00	-3.491E+00	6.516E-16	1.083E-01	0.000E+00	0.000E+00
5	0.000E+00	-3.491E+00	-6.453E-16	-1.083E-01	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	2.485E+00	-1.870E-01	0.000E+00	0.000E+00
8	0.000E+00	-3.705E+00	5.689E-16	9.396E-02	0.000E+00	0.000E+00
9	0.000E+00	-3.705E+00	-5.567E-16	-9.396E-02	0.000E+00	0.000E+00
35	0.000E+00	-2.876E-01	-1.993E+00	1.863E-01	0.000E+00	0.000E+00
36	0.000E+00	-6.275E-01	-1.542E+00	1.841E-01	0.000E+00	0.000E+00
37	0.000E+00	-1.011E+00	-1.139E+00	1.801E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.427E+00	-7.935E-01	1.741E-01	0.000E+00	0.000E+00
39	0.000E+00	-1.863E+00	-5.095E-01	1.659E-01	0.000E+00	0.000E+00
40	0.000E+00	-2.303E+00	-2.903E-01	1.554E-01	0.000E+00	0.000E+00
41	0.000E+00	-2.731E+00	-1.356E-01	1.423E-01	0.000E+00	0.000E+00
42	0.000E+00	-3.133E+00	-4.132E-02	1.266E-01	0.000E+00	0.000E+00
43	0.000E+00	-3.133E+00	4.132E-02	-1.266E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.731E+00	1.355E-01	-1.423E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.303E+00	2.903E-01	-1.554E-01	0.000E+00	0.000E+00
46	0.000E+00	-1.863E+00	5.095E-01	-1.659E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.427E+00	7.935E-01	-1.741E-01	0.000E+00	0.000E+00
48	0.000E+00	-1.011E+00	1.139E+00	-1.801E-01	0.000E+00	0.000E+00
49	0.000E+00	-6.275E-01	1.542E+00	-1.841E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.876E-01	1.993E+00	-1.863E-01	0.000E+00	0.000E+00
51	0.000E+00	-4.325E+00	0.000E+00	1.706E-09	0.000E+00	0.000E+00

Table D11.3: Deflections

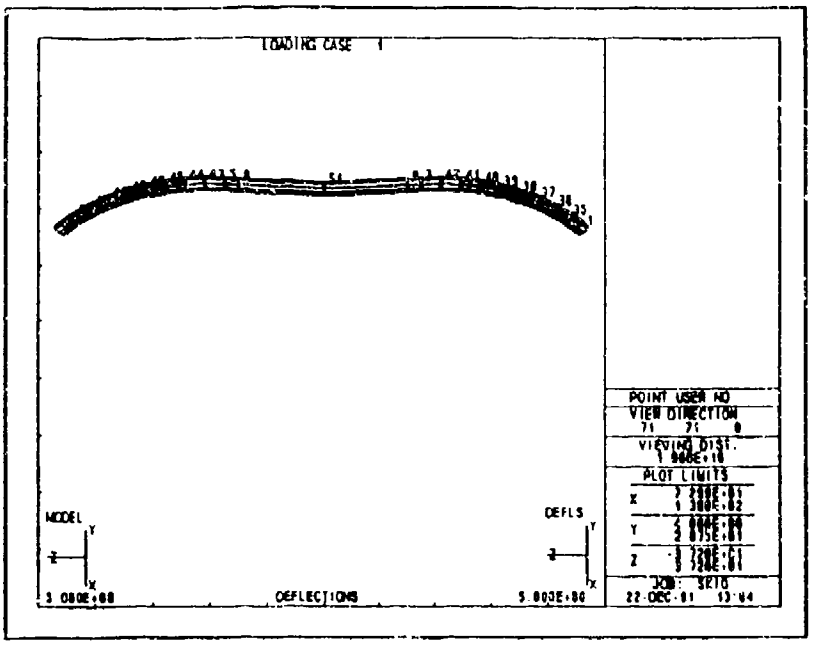


Figure D11.2: Deflected Crosstube

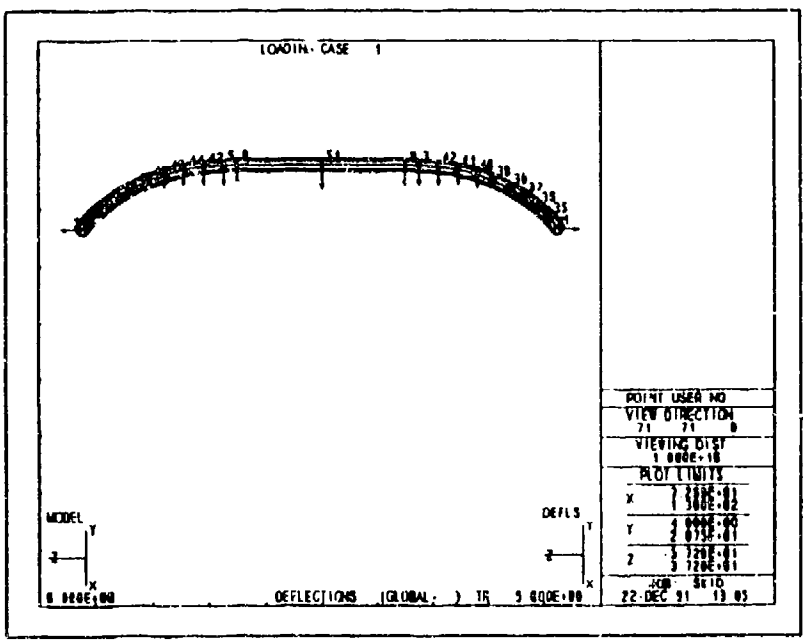


Figure D11.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-6.6791E+03
2	1	-1.2809E+04
3	1	-2.0074E+04
4	1	-2.8341E+04
5	1	-3.7448E+04
6	1	-4.7212E+04
7	1	-5.7438E+04
8	1	-6.7945E+04
9	1	-7.8566E+04
10	1	-7.8566E+04
11	1	-6.7945E+04
12	1	-5.7437E+04
13	1	-4.7212E+04
14	1	-3.7449E+04
15	1	-2.8342E+04
16	1	-2.0075E+04
17	1	-1.2810E+04
18	1	-6.6787E+03
19	1	8.5804E+04
20	1	8.5803E+04
21	1	8.5803E+04
22	1	8.5803E+04

Table D12.2: Principal Stresses

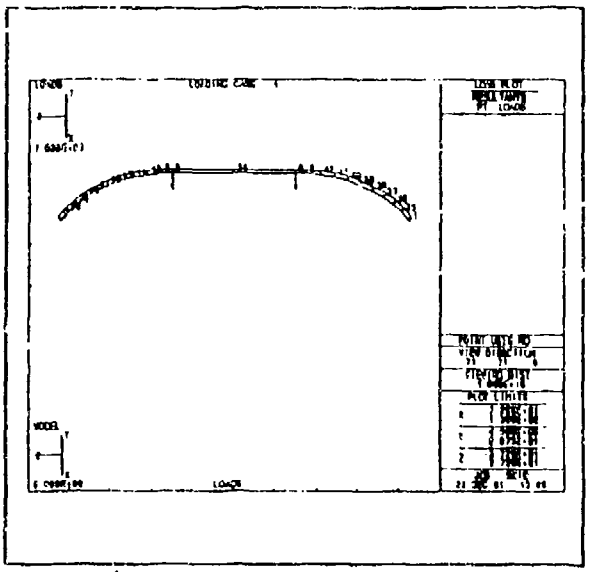


Figure D12.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
8	0.	-1.650E+03	0.
9	0.	-1.650E+03	0.

Table D12.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-2.562E+00	1.928E-01	0.000E+00	0.000E+00
3	0.000E+00	-3.600E+00	6.760E-16	1.116E-01	0.000E+00	0.000E+00
5	0.000E+00	-3.600E+00	-6.661E-16	-1.116E-01	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	2.562E+00	-1.928E-01	0.000E+00	0.000E+00
8	0.000E+00	-3.821E+00	5.860E-16	9.689E-02	0.000E+00	0.000E+00
9	0.000E+00	-3.821E+00	-5.747E-16	-9.689E-02	0.000E+00	0.000E+00
35	0.000E+00	-2.966E-01	-2.056E+00	1.921E-01	0.000E+00	0.000E+00
36	0.000E+00	-6.471E-01	-1.590E+00	1.898E-01	0.000E+00	0.000E+00
37	0.000E+00	-1.043E+00	-1.175E+00	1.857E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.472E+00	-8.183E-01	1.796E-01	0.000E+00	0.000E+00
39	0.000E+00	-1.921E+00	-5.254E-01	1.711E-01	0.000E+00	0.000E+00
40	0.000E+00	-2.375E+00	-2.994E-01	1.602E-01	0.000E+00	0.000E+00
41	0.000E+00	-2.817E+00	-1.398E-01	1.468E-01	0.000E+00	0.000E+00
42	0.000E+00	-3.231E+00	-4.261E-02	1.306E-01	0.000E+00	0.000E+00
43	0.000E+00	-3.231E+00	4.261E-02	-1.306E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.817E+00	1.398E-01	-1.468E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.375E+00	2.994E-01	-1.602E-01	0.000E+00	0.000E+00
46	0.000E+00	-1.921E+00	5.254E-01	-1.711E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.472E+00	8.183E-01	-1.796E-01	0.000E+00	0.000E+00
48	0.000E+00	-1.043E+00	1.175E+00	-1.857E-01	0.000E+00	0.000E+00
49	0.000E+00	-6.471E-01	1.590E+00	-1.898E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.966E-01	2.056E+00	-1.921E-01	0.000E+00	0.000E+00
51	0.000E+00	-4.461E+00	0.000E+00	1.759E-09	0.000E+00	0.000E+00

Table D12.3: Deflections

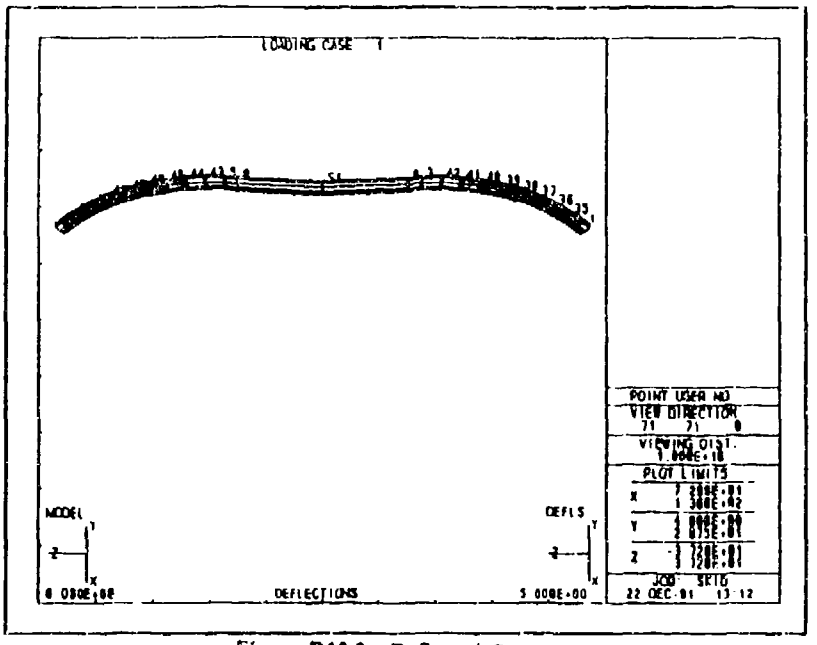


Figure D12.2: Deflected Crosstube

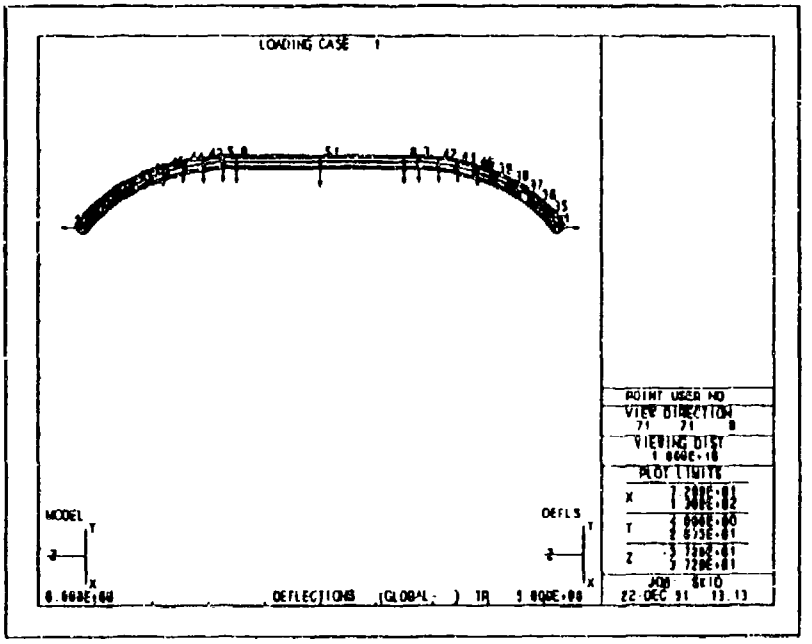


Figure D12.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-6.8820E+03
2	1	-1.3198E+04
3	1	-2.0682E+04
4	1	-2.9200E+04
5	1	-3.8583E+04
6	1	-4.8642E+04
7	1	-5.9178E+04
8	1	-7.0004E+04
9	1	-8.0947E+04
10	1	-8.0947E+04
11	1	-7.0004E+04
12	1	-5.9179E+04
13	1	-4.8642E+04
14	1	-3.8583E+04
15	1	-2.9200E+04
16	1	-2.0683E+04
17	1	-1.3197E+04
18	1	-6.8811E+03
19	1	8.8404E+04
20	1	8.8403E+04
21	1	8.8403E+04
22	1	8.8404E+04

Table D13.2: Principal Stresses

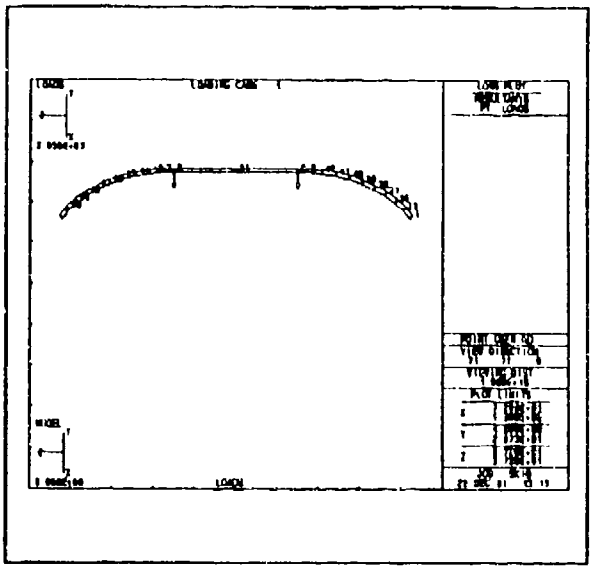


Figure D13.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
8	0.	-1.700E+03	0.
9	0.	-1.700E+03	0.

Table D13.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-2.640E+00	1.987E-01	0.000E+00	0.000E+00
3	0.000E+00	-3.709E+00	6.991E-16	1.150E-01	0.000E+00	0.000E+00
5	0.000E+00	-3.709E+00	-6.870E-16	-1.150E-01	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	2.640E+00	-1.987E-01	0.000E+00	0.000E+00
8	0.000E+00	-3.937E+00	6.080E-16	9.983E-02	0.000E+00	0.000E+00
9	0.000E+00	-3.937E+00	-5.927E-16	-9.983E-02	0.000E+00	0.000E+00
35	0.000E+00	-3.055E-01	-2.118E+00	1.979E-01	0.000E+00	0.000E+00
36	0.000E+00	-6.667E-01	-1.638E+00	1.956E-01	0.000E+00	0.000E+00
37	0.000E+00	-1.074E+00	-1.211E+00	1.913E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.516E+00	-8.431E-01	1.850E-01	0.000E+00	0.000E+00
39	0.000E+00	-1.979E+00	-5.413E-01	1.763E-01	0.000E+00	0.000E+00
40	0.000E+00	-2.446E+00	-3.084E-01	1.651E-01	0.000E+00	0.000E+00
41	0.000E+00	-2.902E+00	-1.440E-01	1.512E-01	0.000E+00	0.000E+00
42	0.000E+00	-3.328E+00	-4.391E-02	1.346E-01	0.000E+00	0.000E+00
43	0.000E+00	-3.328E+00	4.391E-02	-1.346E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.902E+00	1.440E-01	-1.512E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.446E+00	3.084E-01	-1.651E-01	0.000E+00	0.000E+00
46	0.000E+00	-1.979E+00	5.413E-01	-1.763E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.516E+00	8.431E-01	-1.850E-01	0.000E+00	0.000E+00
48	0.000E+00	-1.074E+00	1.211E+00	-1.913E-01	0.000E+00	0.000E+00
49	0.000E+00	-6.667E-01	1.638E+00	-1.956E-01	0.000E+00	0.000E+00
50	0.000E+00	-3.055E-01	2.118E+00	-1.979E-01	0.000E+00	0.000E+00
51	0.000E+00	-4.596E+00	0.000E+00	1.812E-09	0.000E+00	0.000E+00

Table D13.3: Deflections

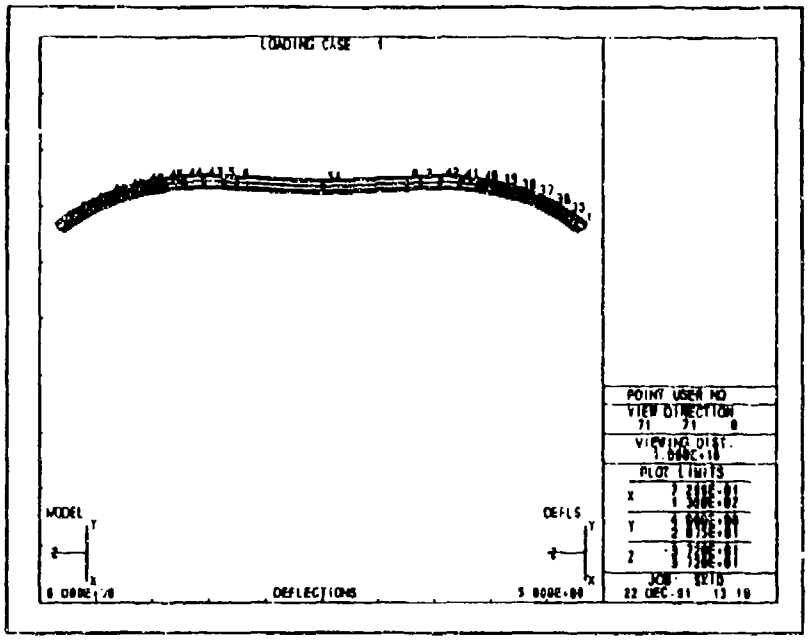


Figure D13.2: Deflected Crosstube

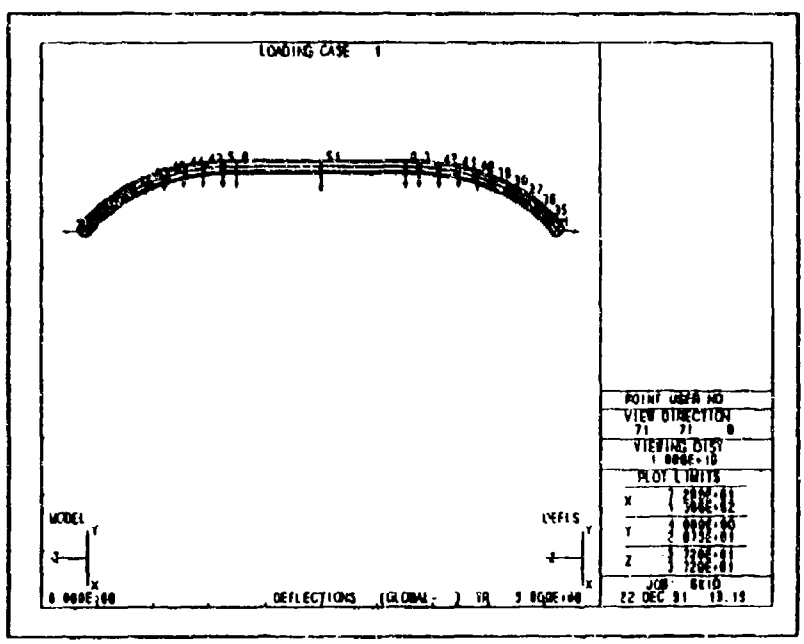


Figure D13.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-7.0832E+03
2	1	-1.3586E+04
3	1	-2.1290E+04
4	1	-3.0059E+04
5	1	-3.9718E+04
6	1	-5.0072E+04
7	1	-6.0918E+04
8	1	-7.2061E+04
9	1	-8.3328E+04
10	1	-8.3328E+04
11	1	-7.2062E+04
12	1	-6.0919E+04
13	1	-5.0072E+04
14	1	-3.9718E+04
15	1	-3.0058E+04
16	1	-2.1291E+04
17	1	-1.3585E+04
18	1	-7.0831E+03
19	1	9.1004E+04
20	1	9.1004E+04
21	1	9.1004E+04
22	1	9.1003E+04

Table D14.2: Principal Stresses

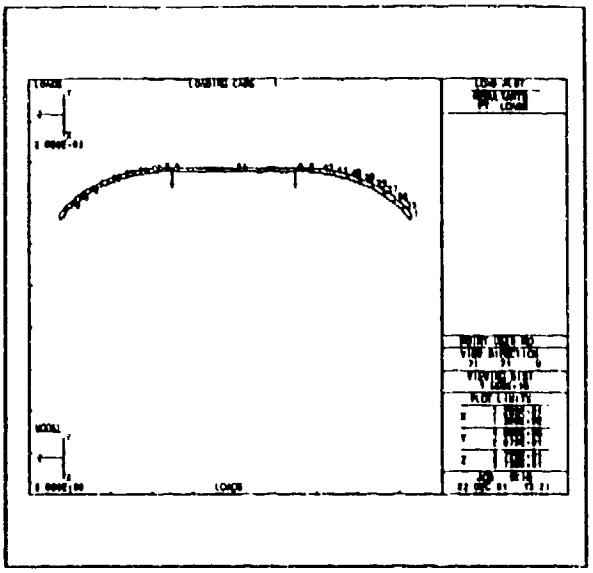


Figure D14.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
8	0.	-1.750E+03	0.
9	0.	-1.750E+03	0.

Table D14.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-2.717E+00	2.045E-01	0.000E+00	0.000E+00
3	0.000E+00	-3.818E+00	7.160E-16	1.184E-01	0.000E+00	0.000E+00
5	0.000E+00	-3.818E+00	-7.095E-16	-1.184E-01	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	2.717E+00	-2.045E-01	0.000E+00	0.000E+00
8	0.000E+00	-4.053E+00	6.221E-16	1.028E-01	0.000E+00	0.000E+00
9	0.000E+00	-4.053E+00	-6.121E-16	-1.028E-01	0.000E+00	0.000E+00
35	0.000E+00	-3.145E-01	-2.180E+00	2.037E-01	0.000E+00	0.000E+00
36	0.000E+00	-6.863E-01	-1.687E+00	2.013E-01	0.000E+00	0.000E+00
37	0.000E+00	-1.106E+00	-1.246E+00	1.970E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.561E+00	-8.679E-01	1.904E-01	0.000E+00	0.000E+00
39	0.000E+00	-2.037E+00	-5.572E-01	1.815E-01	0.000E+00	0.000E+00
40	0.000E+00	-2.518E+00	-3.175E-01	1.700E-01	0.000E+00	0.000E+00
41	0.000E+00	-2.987E+00	-1.483E-01	1.557E-01	0.000E+00	0.000E+00
42	0.000E+00	-3.426E+00	-4.520E-02	1.385E-01	0.000E+00	0.000E+00
43	0.000E+00	-3.426E+00	4.520E-02	-1.385E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.987E+00	1.483E-01	-1.557E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.518E+00	3.175E-01	-1.700E-01	0.000E+00	0.000E+00
46	0.000E+00	-2.037E+00	5.572E-01	-1.815E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.561E+00	8.679E-01	-1.904E-01	0.000E+00	0.000E+00
48	0.000E+00	-1.106E+00	1.246E+00	-1.970E-01	0.000E+00	0.000E+00
49	0.000E+00	-6.863E-01	1.687E+00	-2.013E-01	0.000E+00	0.000E+00
50	0.000E+00	-3.145E-01	2.180E+00	-2.037E-01	0.000E+00	0.000E+00
51	0.000E+00	-4.731E+00	0.000E+00	1.866E-09	0.000E+00	0.000E+00

Table D14.3: Deflections

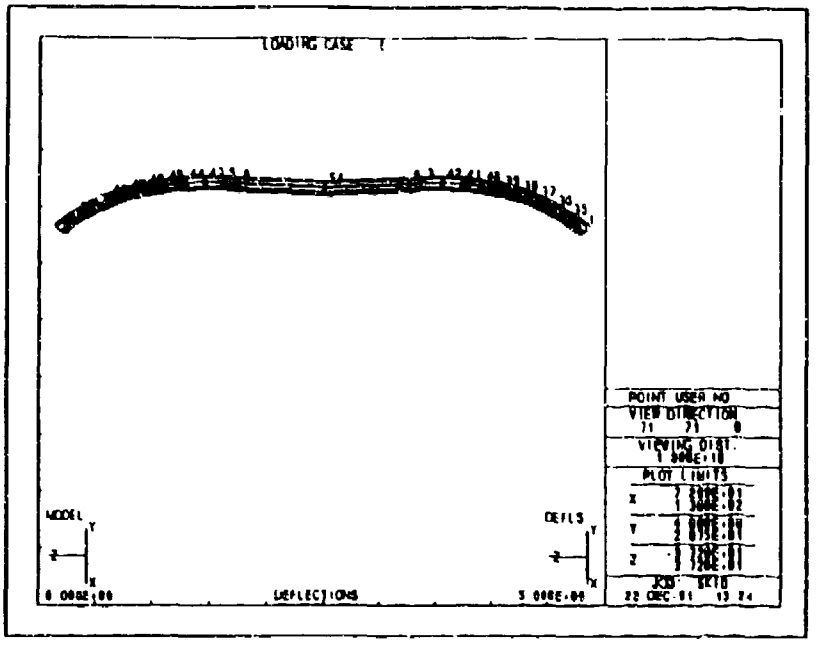


Figure D14.2: Deflected Crosstube

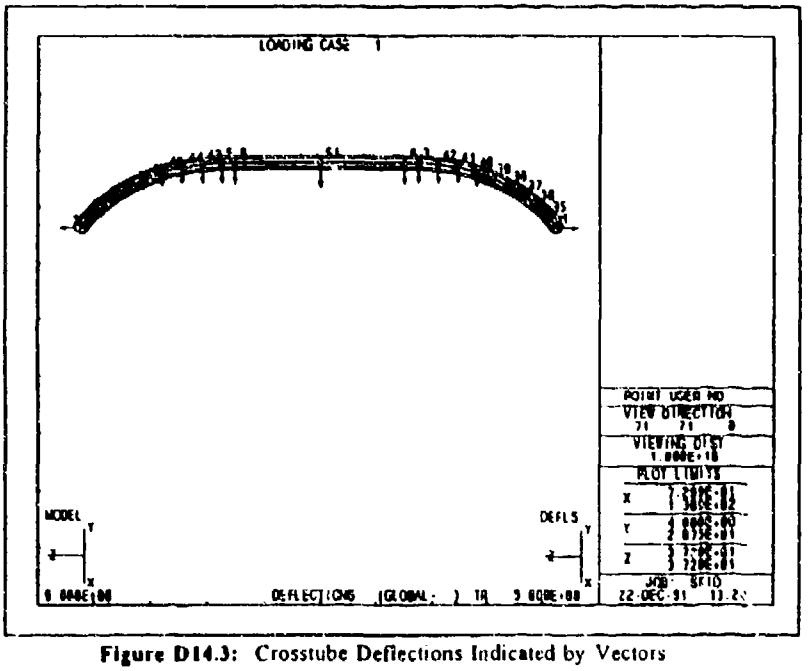


Figure D14.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES ENVELOPE		
ELE NO.	STR PT.	S11
1	1	-7.2860E+03
2	1	-1.3973E+04
3	1	-2.1899E+04
4	1	-3.0918E+04
5	1	-4.0853E+04
6	1	-5.1503E+04
7	1	-6.2658E+04
8	1	-7.4120E+04
9	1	-8.5708E+04
10	1	-8.5709E+04
11	1	-7.4121E+04
12	1	-6.2659E+04
13	1	-5.1504E+04
14	1	-4.0853E+04
15	1	-3.0918E+04
16	1	-2.1899E+04
17	1	-1.3974E+04
18	1	-7.2858E+03
19	1	9.3603E+04
20	1	9.3604E+04
21	1	9.3604E+04
22	1	9.3604E+04

Table D15.2: Principal Stresses

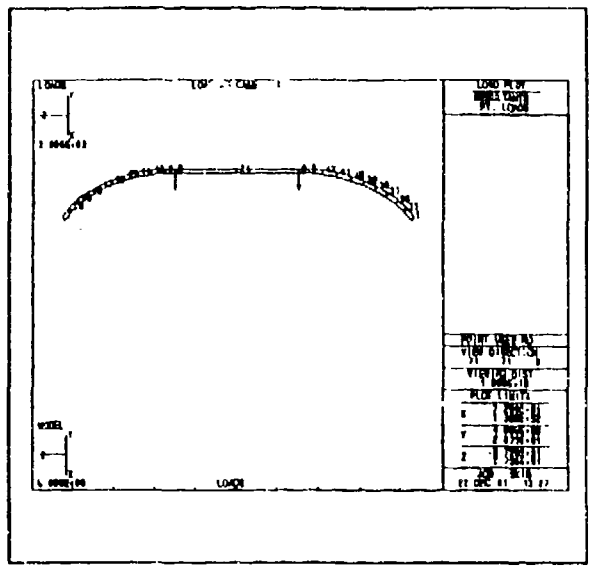


Figure D15.1: Point Location

LOADS			
POINT	FORCE X	FORCE Y	FORCE Z
8	0.	-1.800E+03	0.
9	0.	-1.800E+03	0.

Table D15.1: Applied Loads

DISPLACEMENT INFORMATION						
POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-2.795E+00	2.103E-01	0.000E+00	0.000E+00
3	0.000E+00	-3.927E+00	7.355E-16	1.218E-01	0.000E+00	0.000E+00
5	0.000E+00	-3.927E+00	-7.286E-16	-1.218E-01	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	2.795E+00	-2.103E-01	0.000E+00	0.000E+00
8	0.000E+00	-4.168E+00	6.396E-16	1.057E-01	0.000E+00	0.000E+00
9	0.000E+00	-4.168E+00	-6.286E-16	-1.057E-01	0.000E+00	0.000E+00
35	0.000E+00	-3.235E-01	-2.243E+00	2.096E-01	0.000E+00	0.000E+00
36	0.000E+00	-7.059E-01	-1.735E+00	2.071E-01	0.000E+00	0.000E+00
37	0.000E+00	-1.137E+00	-1.282E+00	2.026E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.605E+00	-8.927E-01	1.959E-01	0.000E+00	0.000E+00
39	0.000E+00	-2.095E+00	-5.732E-01	1.867E-01	0.000E+00	0.000E+00
40	0.000E+00	-2.590E+00	-3.266E-01	1.748E-01	0.000E+00	0.000E+00
41	0.000E+00	-3.073E+00	-1.525E-01	1.601E-01	0.000E+00	0.000E+00
42	0.000E+00	-3.524E+00	-4.649E-02	1.425E-01	0.000E+00	0.000E+00
43	0.000E+00	-3.524E+00	4.649E-02	-1.425E-01	0.000E+00	0.000E+00
44	0.000E+00	-3.073E+00	1.525E-01	-1.601E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.590E+00	3.266E-01	-1.748E-01	0.000E+00	0.000E+00
46	0.000E+00	-2.095E+00	5.732E-01	-1.867E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.605E+00	8.927E-01	-1.959E-01	0.000E+00	0.000E+00
48	0.000E+00	-1.137E+00	1.282E+00	-2.026E-01	0.000E+00	0.000E+00
49	0.000E+00	-7.059E-01	1.735E+00	-2.071E-01	0.000E+00	0.000E+00
50	0.000E+00	-3.235E-01	2.243E+00	-2.096E-01	0.000E+00	0.000E+00
51	0.000E+00	-4.866E+00	0.000E+00	1.919E-09	0.000E+00	0.000E+00

Table D15.3: Deflections

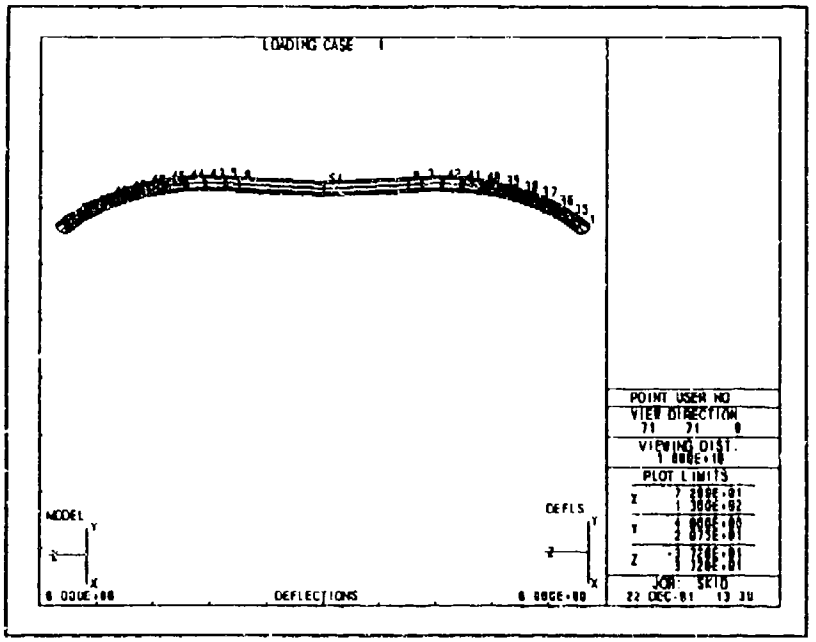


Figure D15.2: Deflected Crosstube

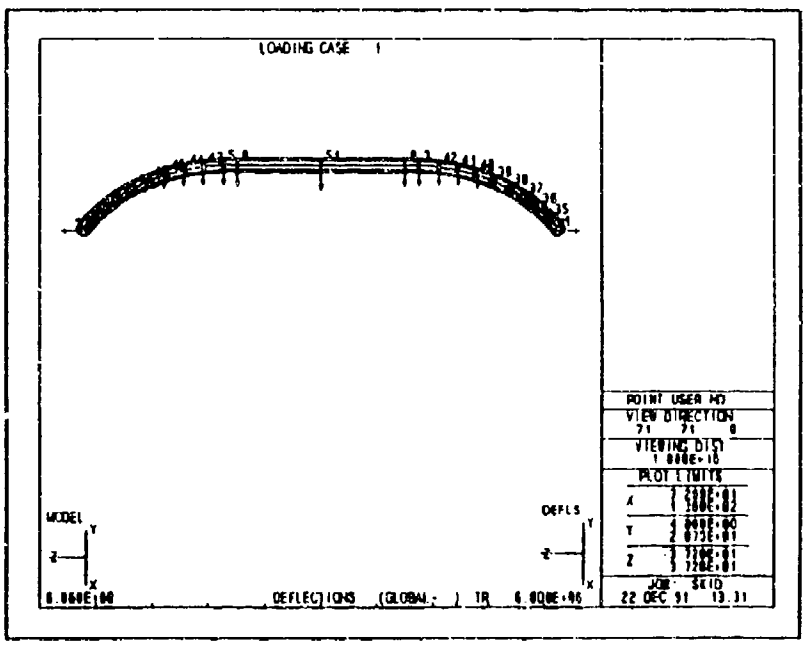


Figure D15.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	G11
1	1	-7.4877E+03
2	1	-1.4362E+04
3	1	-2.2507E+04
4	1	-3.1776E+04
5	1	-4.1988E+04
6	1	-5.2934E+04
7	1	-6.4400E+04
8	1	-7.6181E+04
9	1	-8.8089E+04
10	1	-8.8089E+04
11	1	-7.6180E+04
12	1	-6.4400E+04
13	1	-5.2934E+04
14	1	-4.1988E+04
15	1	-3.1775E+04
16	1	-2.2508E+04
17	1	-1.4362E+04
18	1	-7.4877E+03
19	1	9.6204E+04
20	1	9.6204E+04
21	1	9.6204E+04
22	1	9.6204E+04

Table D16.2: Principal Stresses

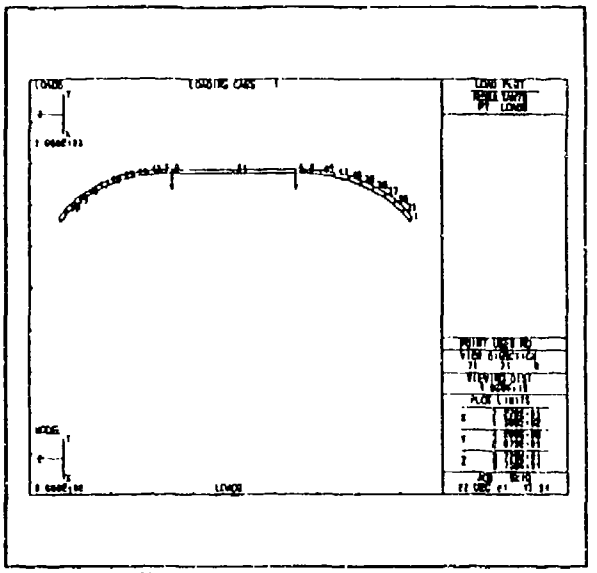


Figure D16.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
8	0.	-1.850E+03	0.
9	0.	-1.850E+03	0.

Table D16.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
1	0.000E+00	0.000E+00	-2.873E+00	2.162E-01	0.000E+00	0.000E+00
3	0.000E+00	-4.036E+00	7.481E-16	1.252E-01	0.000E+00	0.000E+00
5	0.000E+00	-4.036E+00	-7.494E-16	-1.252E-01	0.000E+00	0.000E+00
7	0.000E+00	0.000E+00	2.873E+00	-2.162E-01	0.000E+00	0.000E+00
8	0.000E+00	-4.284E+00	6.484E-16	1.086E-01	0.000E+00	0.000E+00
9	0.000E+00	-4.284E+00	-6.465E-16	-1.086E-01	0.000E+00	0.000E+00
35	0.000E+00	-3.325E-01	-2.305E+00	2.154E-01	0.000E+00	0.000E+00
36	0.000E+00	-7.256E-01	-1.783E+00	2.128E-01	0.000E+00	0.000E+00
37	0.000E+00	-1.169E+00	-1.318E+00	2.082E-01	0.000E+00	0.000E+00
38	0.000E+00	-1.650E+00	-9.175E-01	2.013E-01	0.000E+00	0.000E+00
39	0.000E+00	-2.154E+00	-5.891E-01	1.919E-01	0.000E+00	0.000E+00
40	0.000E+00	-2.662E+00	-3.357E-01	1.797E-01	0.000E+00	0.000E+00
41	0.000E+00	-3.158E+00	-1.567E-01	1.646E-01	0.000E+00	0.000E+00
42	0.000E+00	-3.622E+00	-4.778E-02	1.464E-01	0.000E+00	0.000E+00
43	0.000E+00	-3.622E+00	4.778E-02	-1.464E-01	0.000E+00	0.000E+00
44	0.000E+00	-3.158E+00	1.567E-01	-1.646E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.662E+00	3.357E-01	-1.797E-01	0.000E+00	0.000E+00
46	0.000E+00	-2.154E+00	5.891E-01	-1.919E-01	0.000E+00	0.000E+00
47	0.000E+00	-1.650E+00	9.175E-01	-2.013E-01	0.000E+00	0.000E+00
48	0.000E+00	-1.169E+00	1.318E+00	-2.082E-01	0.000E+00	0.000E+00
49	0.000E+00	-7.256E-01	1.783E+00	-2.128E-01	0.000E+00	0.000E+00
50	0.000E+00	-3.325E-01	2.305E+00	-2.154E-01	0.000E+00	0.000E+00
51	0.000E+00	-5.001E+00	0.000E+00	1.972E-09	0.000E+00	0.000E+00

Table D16.3: Deflections

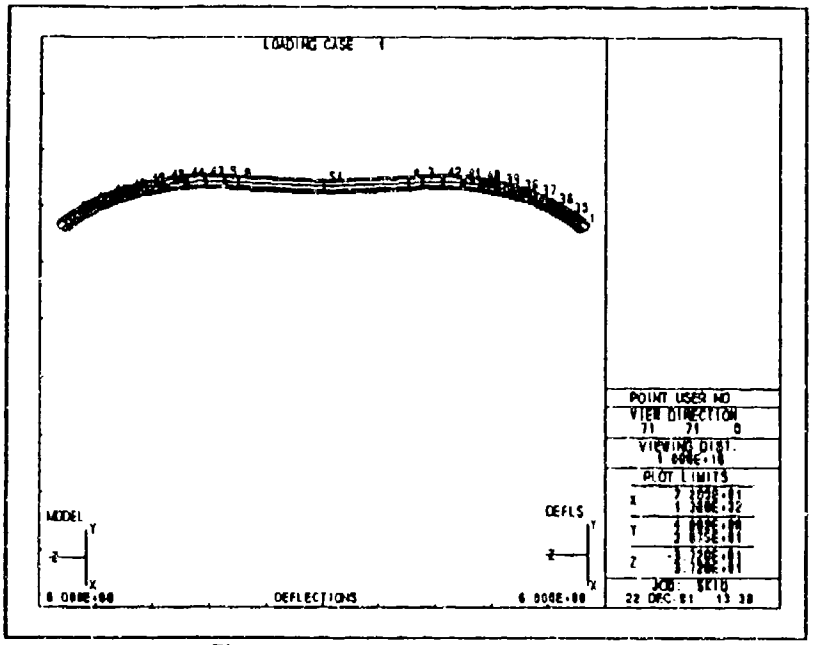


Figure D16.2: Deflected Crosstube

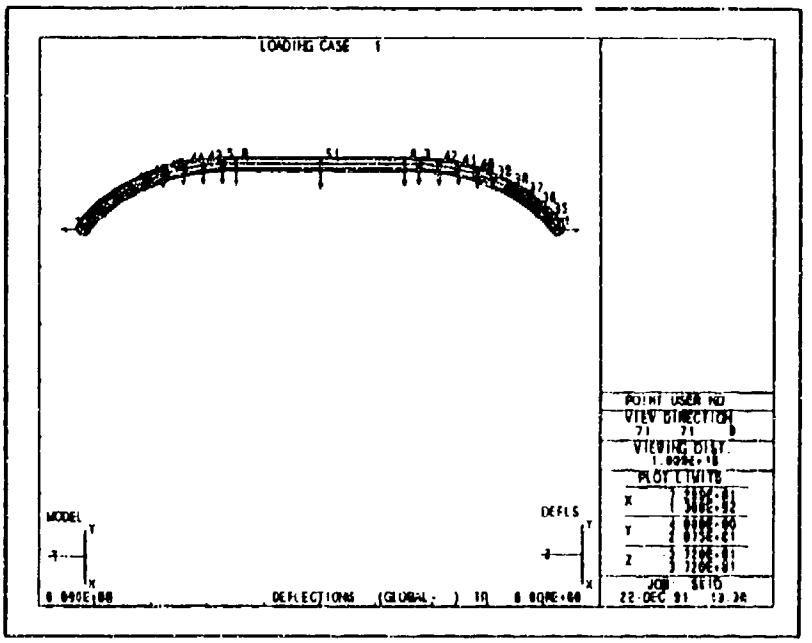


Figure D16.3: Crosstube Deflections Indicated by Vectors

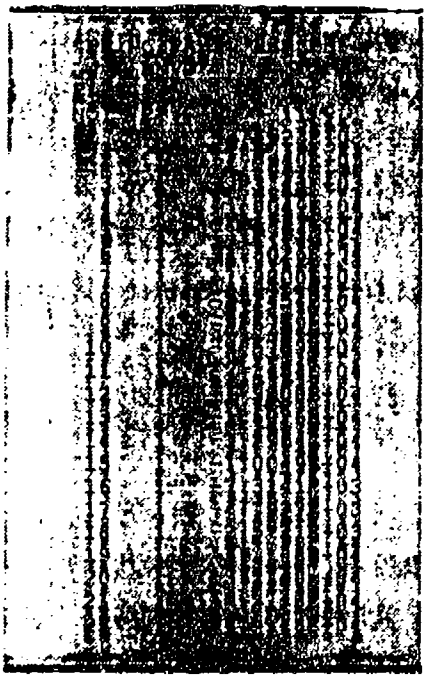


Table D17.2: Principal Stresses

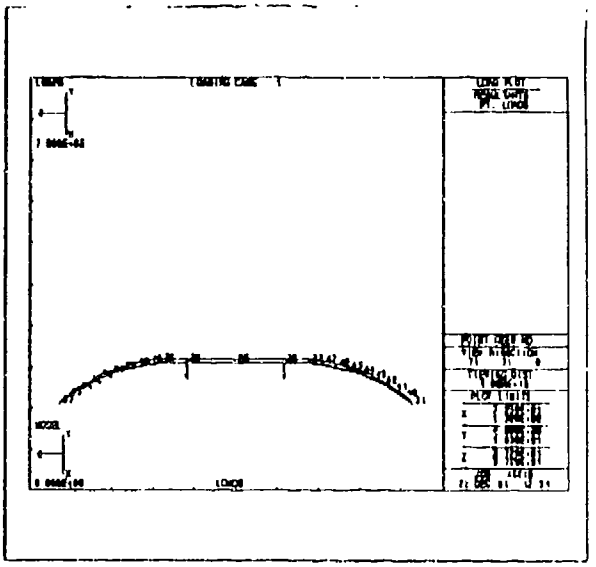


Figure D17.1: Point Location

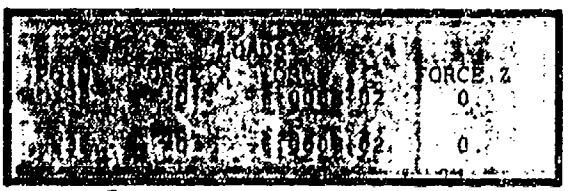


Table D17.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
31	0.000E+00	0.000E+00	-7.871E-01	6.754E-02	0.000E+00	0.000E+00
33	0.000E+00	-1.261E+00	4.425E-16	4.164E-02	0.000E+00	0.000E+00
35	0.000E+00	-1.261E+00	-3.755E-16	-4.164E-02	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	7.871E-01	-6.754E-02	0.000E+00	0.000E+00
38	0.000E+00	-1.455E+00	2.864E-16	2.818E-02	0.000E+00	0.000E+00
39	0.000E+00	-1.455E+00	-2.450E-16	-2.818E-02	0.000E+00	0.000E+00
40	0.000E+00	-1.229E-01	-6.394E-01	6.728E-02	0.000E+00	0.000E+00
41	0.000E+00	-2.570E-01	-5.038E-01	6.646E-02	0.000E+00	0.000E+00
42	0.000E+00	-4.001E-01	-3.824E-01	6.504E-02	0.000E+00	0.000E+00
43	0.000E+00	-5.491E-01	-2.767E-01	6.298E-02	0.000E+00	0.000E+00
44	0.000E+00	-7.008E-01	-1.878E-01	6.022E-02	0.000E+00	0.000E+00
45	0.000E+00	-8.517E-01	-1.160E-01	5.673E-02	0.000E+00	0.000E+00
46	0.000E+00	-9.980E-01	-6.148E-02	5.249E-02	0.000E+00	0.000E+00
47	0.000E+00	-1.136E+00	-2.330E-02	4.747E-02	0.000E+00	0.000E+00
48	0.000E+00	-1.136E+00	2.330E-02	-4.747E-02	0.000E+00	0.000E+00
49	0.000E+00	-9.980E-01	6.148E-02	-5.249E-02	0.000E+00	0.000E+00
50	0.000E+00	-8.517E-01	1.160E-01	-5.673E-02	0.000E+00	0.000E+00
51	0.000E+00	-7.008E-01	1.878E-01	-6.022E-02	0.000E+00	0.000E+00
52	0.000E+00	-5.491E-01	2.767E-01	-6.298E-02	0.000E+00	0.000E+00
53	0.000E+00	-4.001E-01	3.824E-01	-6.504E-02	0.000E+00	0.000E+00
54	0.000E+00	-2.570E-01	5.038E-01	-6.646E-02	0.000E+00	0.000E+00
55	0.000E+00	-1.229E-01	6.394E-01	-6.728E-02	0.000E+00	0.000E+00
56	0.000E+00	-1.599E+00	0.000E+00	-1.605E-11	0.000E+00	0.000E+00

Table D17.3: Deflections

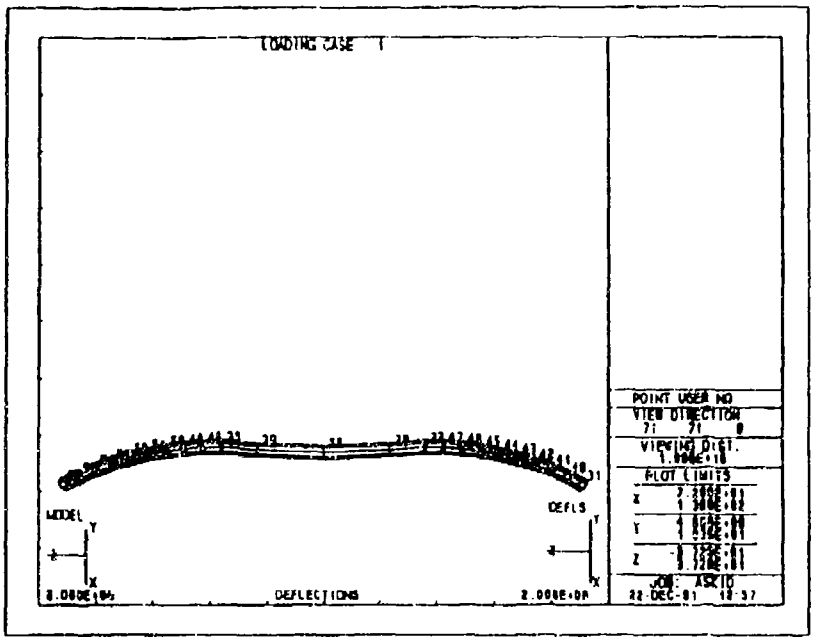


Figure D17.2: Deflected Crosstube

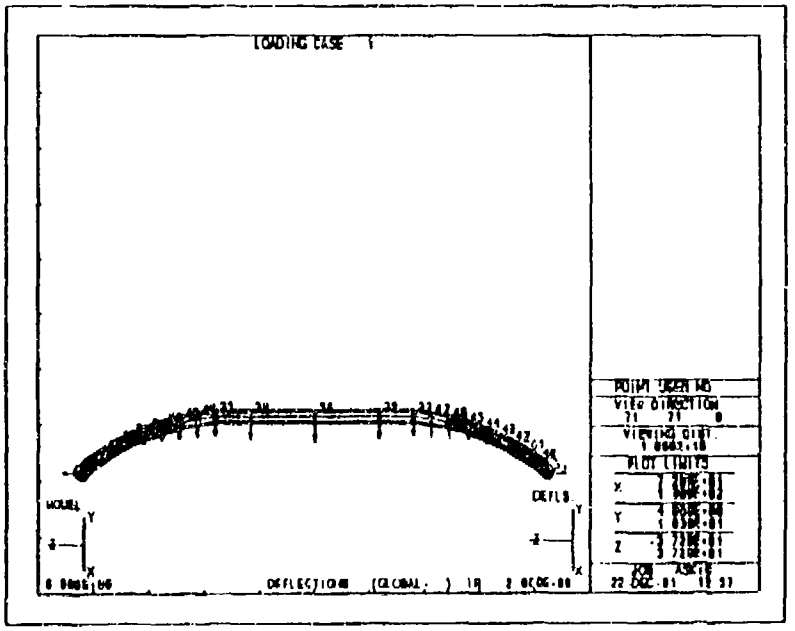


Figure D17.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-3.3628E+03
2	1	-6.3921E+03
3	1	-9.7521E+03
4	1	-1.3398E+04
5	1	-1.7285E+04
6	1	-2.1368E+04
7	1	-2.5600E+04
8	1	-2.9939E+04
9	1	-3.4345E+04
10	1	-3.4345E+04
11	1	-2.9939E+04
12	1	-2.5600E+04
13	1	-2.1368E+04
14	1	-1.7286E+04
15	1	-1.3398E+04
16	1	-9.7520E+03
17	1	-6.3918E+03
18	1	-3.3626E+03
19	1	-4.2864E+04
20	1	-4.2864E+04
21	1	-4.2864E+04
22	1	-4.2864E+04

Table D18.2: Principal Stresses

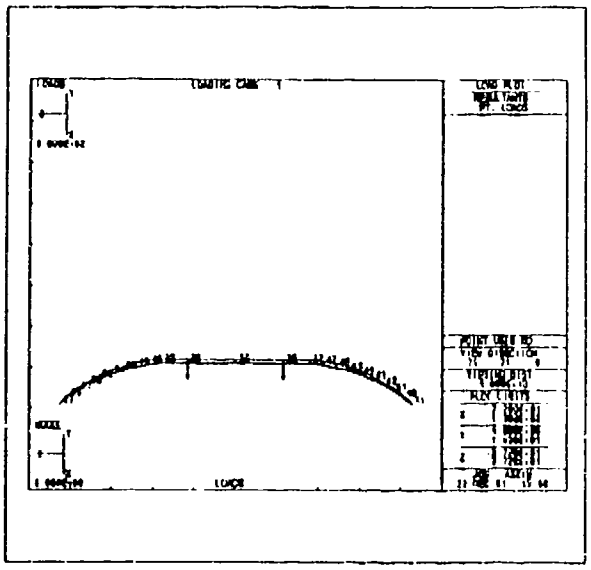


Figure D18.1: Point Location

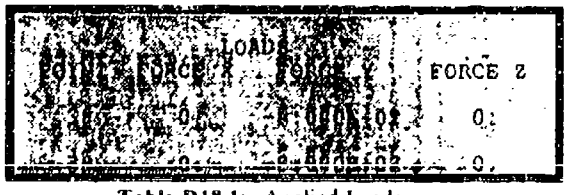


Table D18.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
31	0.000E+00	0.000E+00	-1.049E+00	9.005E-02	0.000E+00	0.000E+00
33	0.000E+00	-1.682E+00	5.889E-16	5.552E-02	0.000E+00	0.000E+00
35	0.000E+00	-1.682E+00	-4.948E-16	-5.552E-02	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	1.049E+00	-9.005E-02	0.000E+00	0.000E+00
38	0.000E+00	-1.940E+00	3.813E-16	3.757E-02	0.000E+00	0.000E+00
39	0.000E+00	-1.940E+00	-3.231E-16	-3.757E-02	0.000E+00	0.000E+00
40	0.000E+00	-1.638E-01	-8.525E-01	8.970E-02	0.000E+00	0.000E+00
41	0.000E+00	-3.427E-01	-6.718E-01	8.862E-02	0.000E+00	0.000E+00
42	0.000E+00	-5.334E-01	-5.099E-01	8.672E-02	0.000E+00	0.000E+00
43	0.000E+00	-7.321E-01	-3.690E-01	8.397E-02	0.000E+00	0.000E+00
44	0.000E+00	-9.345E-01	-2.503E-01	8.029E-02	0.000E+00	0.000E+00
45	0.000E+00	-1.136E+00	-1.547E-01	7.564E-02	0.000E+00	0.000E+00
46	0.000E+00	-1.331E+00	-8.198E-02	6.999E-02	0.000E+00	0.000E+00
47	0.000E+00	-1.514E+00	-3.107E-02	6.329E-02	0.000E+00	0.000E+00
48	0.000E+00	-1.514E+00	3.107E-02	-6.329E-02	0.000E+00	0.000E+00
49	0.000E+00	-1.331E+00	8.198E-02	-6.999E-02	0.000E+00	0.000E+00
50	0.000E+00	-1.136E+00	1.547E-01	-7.564E-02	0.000E+00	0.000E+00
51	0.000E+00	-9.345E-01	2.503E-01	-8.029E-02	0.000E+00	0.000E+00
52	0.000E+00	-7.321E-01	3.690E-01	-8.397E-02	0.000E+00	0.000E+00
53	0.000E+00	-5.334E-01	5.099E-01	-8.672E-02	0.000E+00	0.000E+00
54	0.000E+00	-3.427E-01	6.718E-01	-8.862E-02	0.000E+00	0.000E+00
55	0.000E+00	-1.638E-01	8.525E-01	-8.970E-02	0.000E+00	0.000E+00
56	0.000E+00	-2.132E+00	0.000E+00	-2.140E-11	0.000E+00	0.000E+00

Table D18.3: Deflections

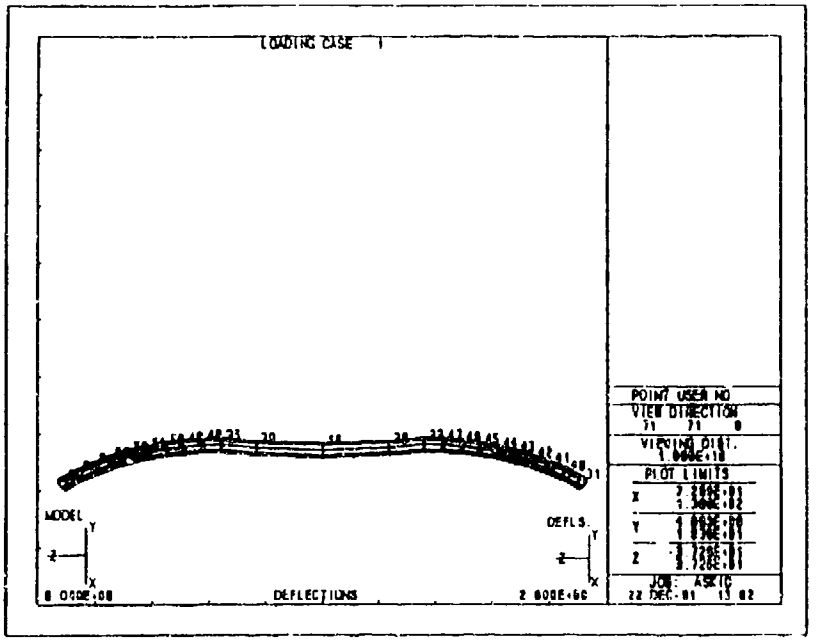


Figure D18.2: Deflected Crosstube

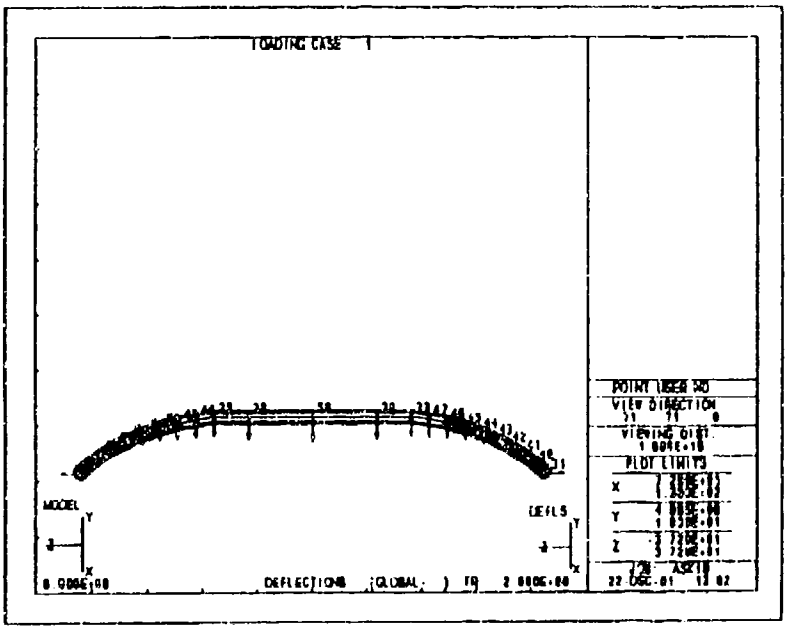


Figure D18.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-4.2035E+03
2	1	-7.9900E+03
3	1	-1.2190E+04
4	1	-1.6748E+04
5	1	-2.1607E+04
6	1	-2.6710E+04
7	1	-3.2000E+04
8	1	-3.7423E+04
9	1	-4.2932E+04
10	1	-4.2932E+04
11	1	-3.7424E+04
12	1	-3.2000E+04
13	1	-2.6710E+04
14	1	-2.1607E+04
15	1	-1.6748E+04
16	1	-1.2190E+04
17	1	-7.9895E+03
18	1	-4.2037E+03
19	1	-5.3580E+04
20	1	-5.3580E+04
21	1	-5.3580E+04
22	1	-5.3580E+04

Table D19.2: Principal Stresses

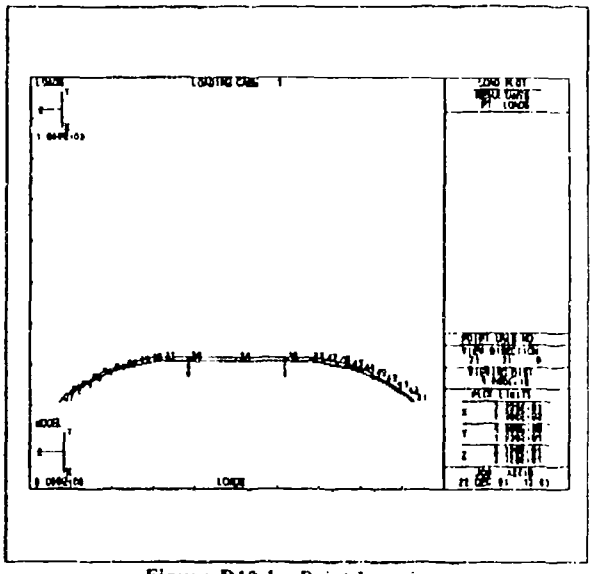


Figure D19.1: Point Location

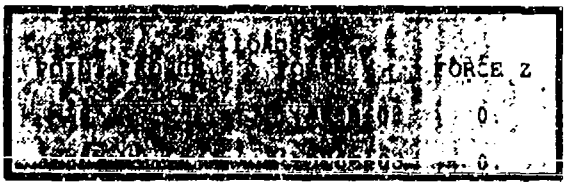


Table D19.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
31	0.000E+00	0.000E+00	-1.312E+00	1.126E-01	0.000E+00	0.000E+00
33	0.000E+00	-2.102E+00	7.393E-16	6.940E-02	0.000E+00	0.000E+00
35	0.000E+00	-2.102E+00	-6.186E-16	-6.940E-02	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	1.312E+00	-1.126E-01	0.000E+00	0.000E+00
38	0.000E+00	-2.424E+00	4.780E-16	4.696E-02	0.000E+00	0.000E+00
39	0.000E+00	-2.424E+00	-4.038E-16	-4.696E-02	0.000E+00	0.000E+00
40	0.000E+00	-2.048E-01	-1.066E+00	1.121E-01	0.000E+00	0.000E+00
41	0.000E+00	-4.284E-01	-8.397E-01	1.108E-01	0.000E+00	0.000E+00
42	0.000E+00	-6.668E-01	-6.374E-01	1.084E-01	0.000E+00	0.000E+00
43	0.000E+00	-9.152E-01	-4.612E-01	1.050E-01	0.000E+00	0.000E+00
44	0.000E+00	-1.168E+00	-3.129E-01	1.004E-01	0.000E+00	0.000E+00
45	0.000E+00	-1.420E+00	-1.934E-01	9.456E-02	0.000E+00	0.000E+00
46	0.000E+00	-1.663E+00	-1.025E-01	8.749E-02	0.000E+00	0.000E+00
47	0.000E+00	-1.893E+00	-3.883E-02	7.911E-02	0.000E+00	0.000E+00
48	0.000E+00	-1.893E+00	3.883E-02	-7.911E-02	0.000E+00	0.000E+00
49	0.000E+00	-1.663E+00	1.025E-01	-8.749E-02	0.000E+00	0.000E+00
50	0.000E+00	-1.420E+00	1.934E-01	-9.456E-02	0.000E+00	0.000E+00
51	0.000E+00	-1.168E+00	3.129E-01	-1.004E-01	0.000E+00	0.000E+00
52	0.000E+00	-9.152E-01	4.612E-01	-1.050E-01	0.000E+00	0.000E+00
53	0.000E+00	-6.668E-01	6.374E-01	-1.084E-01	0.000E+00	0.000E+00
54	0.000E+00	-4.284E-01	8.397E-01	-1.108E-01	0.000E+00	0.000E+00
55	0.000E+00	-2.048E-01	1.066E+00	-1.121E-01	0.000E+00	0.000E+00
56	0.000E+00	-2.665E+00	0.000E+00	-2.675E-11	0.000E+00	0.000E+00

Table D19.3: Deflections

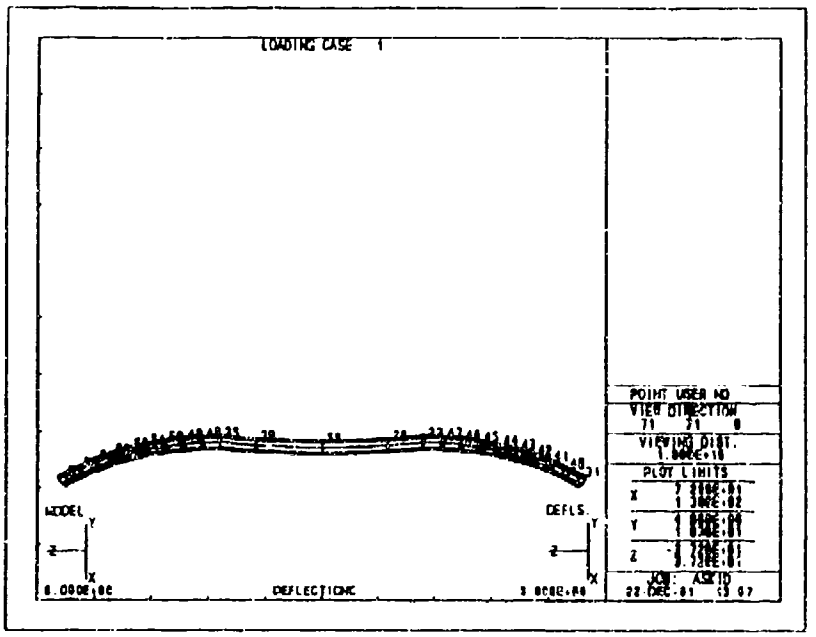


Figure D19.2: Deflected Crosstube

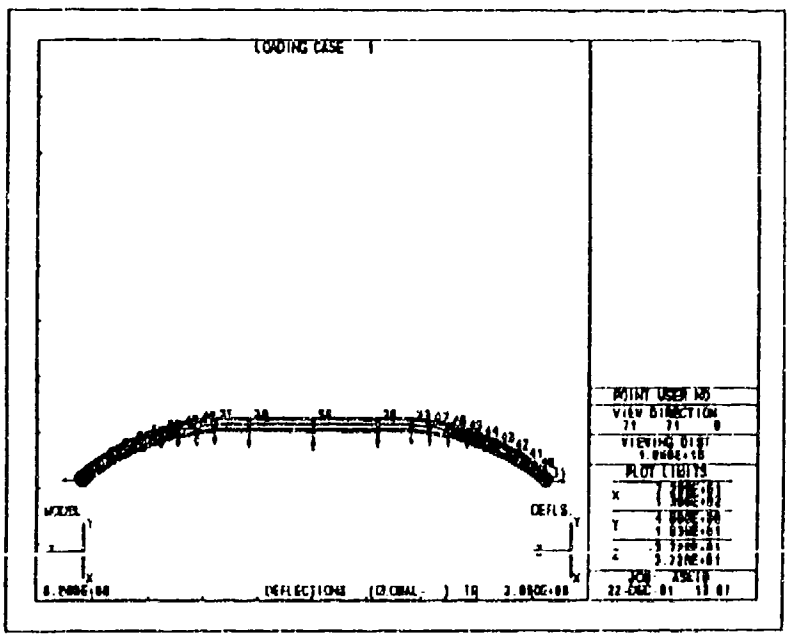


Figure D19.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-5.0446E+03
2	1	-9.5880E+03
3	1	-1.4629E+04
4	1	-2.0098E+04
5	1	-2.5928E+04
6	1	-3.2052E+04
7	1	-3.8400E+04
8	1	-4.4908E+04
9	1	-5.1518E+04
10	1	-5.1518E+04
11	1	-4.4908E+04
12	1	-3.8401E+04
13	1	-3.2053E+04
14	1	-2.5927E+04
15	1	-2.0098E+04
16	1	-1.4628E+04
17	1	-9.5874E+03
18	1	-5.0442E+03
19	1	-6.4297E+04
20	1	-6.4296E+04
21	1	-6.4296E+04
22	1	-6.4296E+04

Table D20.2: Principal Stresses

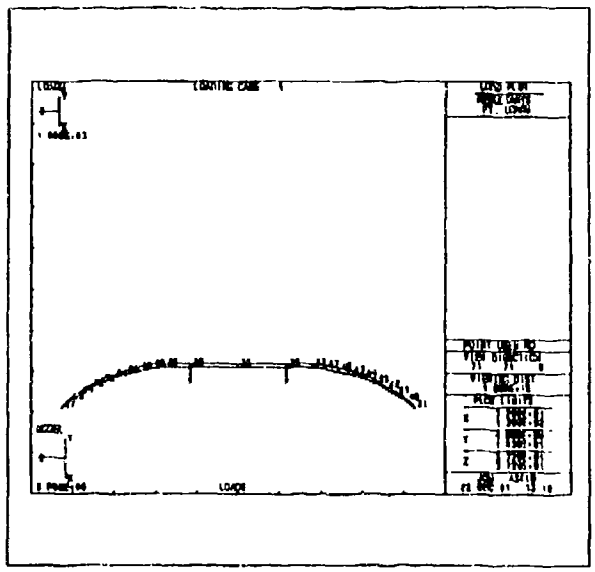


Figure D20.1: Point Location

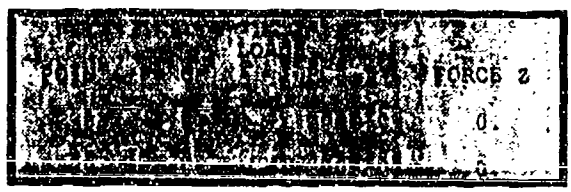


Table D20.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
31	0.000E+00	0.000E+00	-1.574E+00	1.351E-01	0.000E+00	0.000E+00
33	0.000E+00	-2.523E+00	8.851E-16	8.329E-02	0.000E+00	0.000E+00
35	0.000E+00	-2.523E+00	-7.509E-16	-8.329E-02	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	1.574E+00	-1.351E-01	0.000E+00	0.000E+00
38	0.000E+00	-2.909E+00	5.728E-16	5.635E-02	0.000E+00	0.000E+00
39	0.000E+00	-2.909E+00	-4.901E-16	-5.635E-02	0.000E+00	0.000E+00
40	0.000E+00	-2.457E-01	-1.279E+00	1.346E-01	0.000E+00	0.000E+00
41	0.000E+00	-5.141E-01	-1.008E+00	1.329E-01	0.000E+00	0.000E+00
42	0.000E+00	-8.002E-01	-7.649E-01	1.301E-01	0.000E+00	0.000E+00
43	0.000E+00	-1.098E+00	-5.535E-01	1.260E-01	0.000E+00	0.000E+00
44	0.000E+00	-1.402E+00	-3.755E-01	1.204E-01	0.000E+00	0.000E+00
45	0.000E+00	-1.703E+00	-2.321E-01	1.135E-01	0.000E+00	0.000E+00
46	0.000E+00	-1.996E+00	-1.230E-01	1.050E-01	0.000E+00	0.000E+00
47	0.000E+00	-2.272E+00	-4.660E-02	9.494E-02	0.000E+00	0.000E+00
48	0.000E+00	-2.272E+00	4.660E-02	-9.494E-02	0.000E+00	0.000E+00
49	0.000E+00	-1.996E+00	1.230E-01	-1.050E-01	0.000E+00	0.000E+00
50	0.000E+00	-1.703E+00	2.321E-01	-1.135E-01	0.000E+00	0.000E+00
51	0.000E+00	-1.402E+00	3.755E-01	-1.204E-01	0.000E+00	0.000E+00
52	0.000E+00	-1.098E+00	5.535E-01	-1.260E-01	0.000E+00	0.000E+00
53	0.000E+00	-8.002E-01	7.649E-01	-1.301E-01	0.000E+00	0.000E+00
54	0.000E+00	-5.141E-01	1.008E+00	-1.329E-01	0.000E+00	0.000E+00
55	0.000E+00	-2.457E-01	1.279E+00	-1.346E-01	0.000E+00	0.000E+00
56	0.000E+00	-3.198E+00	0.000E+00	-3.209E-11	0.000E+00	0.000E+00

Table D20.3: Deflections

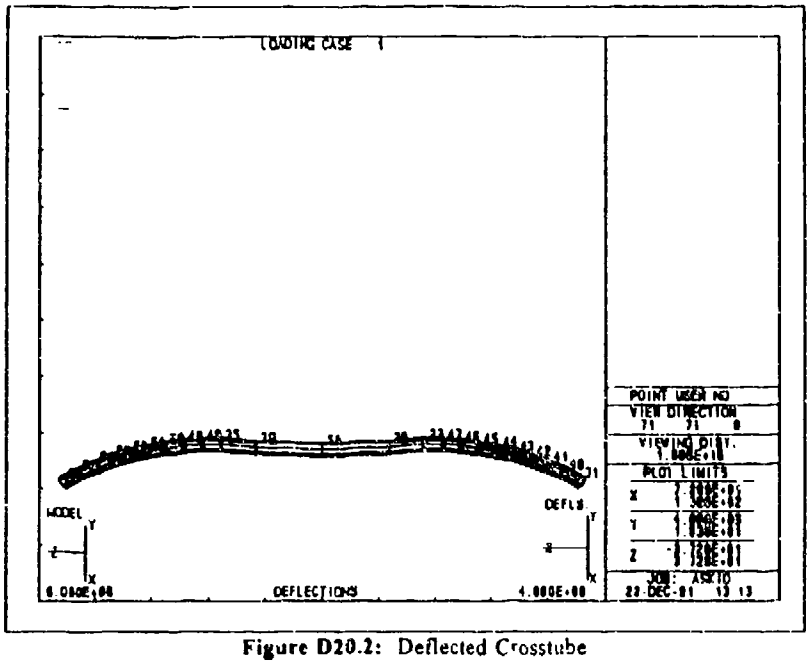


Figure D20.2: Deflected Crosstube

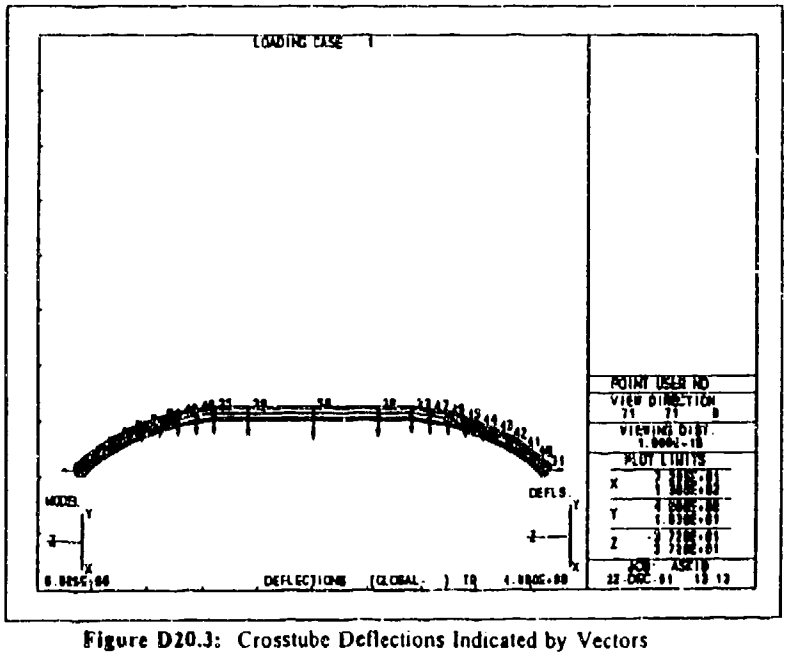


Figure D20.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-5.8849E+03
2	1	-1.1186E+04
3	1	-1.7066E+04
4	1	-2.3447E+04
5	1	-3.0250E+04
6	1	-3.7393E+04
7	1	-4.4800E+04
8	1	-5.2393E+04
9	1	-6.0104E+04
10	1	-6.0104E+04
11	1	-5.2393E+04
12	1	-4.4801E+04
13	1	-3.7394E+04
14	1	-3.0250E+04
15	1	-2.3447E+04
16	1	-1.7066E+04
17	1	-1.1186E+04
18	1	-5.8854E+03
19	1	-7.5013E+04
20	1	-7.5012E+04
21	1	-7.5012E+04
22	1	-7.5013E+04

Table D21.2: Principal Stresses

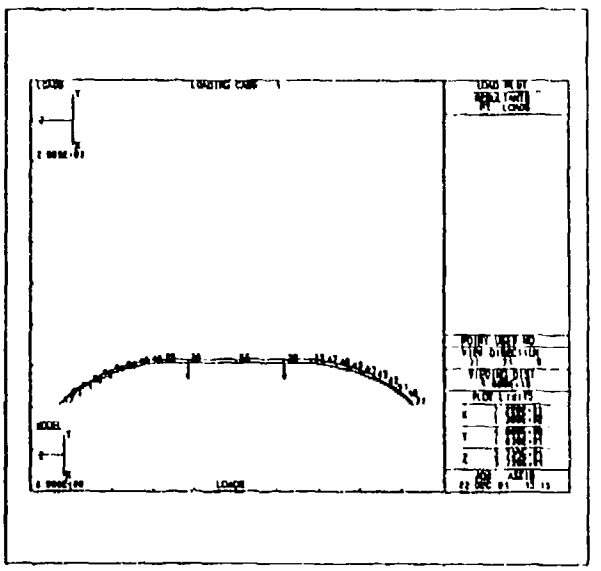


Figure D21.1: Point Location

POINT	FORCE X	FORCE Y	FORCE Z
49	0.	1.000E+03	0.
50	0.	1.000E+03	0.

Table D21.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
31	0.000E+00	0.000E+00	-1.837E+00	1.576E-01	0.000E+00	0.000E+00
33	0.000E+00	-2.943E+00	1.033E-15	9.717E-02	0.000E+00	0.000E+00
35	0.000E+00	-2.943E+00	-8.639E-16	-9.717E-02	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	1.837E+00	-1.576E-01	0.000E+00	0.000E+00
38	0.000E+00	-3.394E+00	6.673E-16	6.574E-02	0.000E+00	0.000E+00
39	0.000E+00	-3.394E+00	-5.640E-16	-6.574E-02	0.000E+00	0.000E+00
40	0.000E+00	-2.867E-01	-1.492E+00	1.570E-01	0.000E+00	0.000E+00
41	0.000E+00	-5.998E-01	-1.176E+00	1.551E-01	0.000E+00	0.000E+00
42	0.000E+00	-9.335E-01	-8.924E-01	1.518E-01	0.000E+00	0.000E+00
43	0.000E+00	-1.281E+00	-6.457E-01	1.469E-01	0.000E+00	0.000E+00
44	0.000E+00	-1.635E+00	-4.381E-01	1.405E-01	0.000E+00	0.000E+00
45	0.000E+00	-1.987E+00	-2.708E-01	1.324E-01	0.000E+00	0.000E+00
46	0.000E+00	-2.329E+00	-1.435E-01	1.225E-01	0.000E+00	0.000E+00
47	0.000E+00	-2.650E+00	-5.437E-02	1.108E-01	0.000E+00	0.000E+00
48	0.000E+00	-2.650E+00	5.437E-02	-1.108E-01	0.000E+00	0.000E+00
49	0.000E+00	-2.329E+00	1.435E-01	-1.225E-01	0.000E+00	0.000E+00
50	0.000E+00	-1.987E+00	2.708E-01	-1.324E-01	0.000E+00	0.000E+00
51	0.000E+00	-1.635E+00	4.381E-01	-1.405E-01	0.000E+00	0.000E+00
52	0.000E+00	-1.281E+00	6.457E-01	-1.469E-01	0.000E+00	0.000E+00
53	0.000E+00	-9.335E 01	8.924E-01	-1,518E-01	0.000E+00	0.000E+00
54	0.000E+00	-5.998E-01	1.176E+00	-1.551E-01	0.000E+00	0.000E+00
55	0.000E+00	-2.867E-01	1.492E+00	-1.570E-01	0.000E+00	0.000E+00
56	0.000E+00	-3.731E+00	0.000E+00	-3.744E-11	0.000E+00	0.000E+00

Table D21.3: Deflections

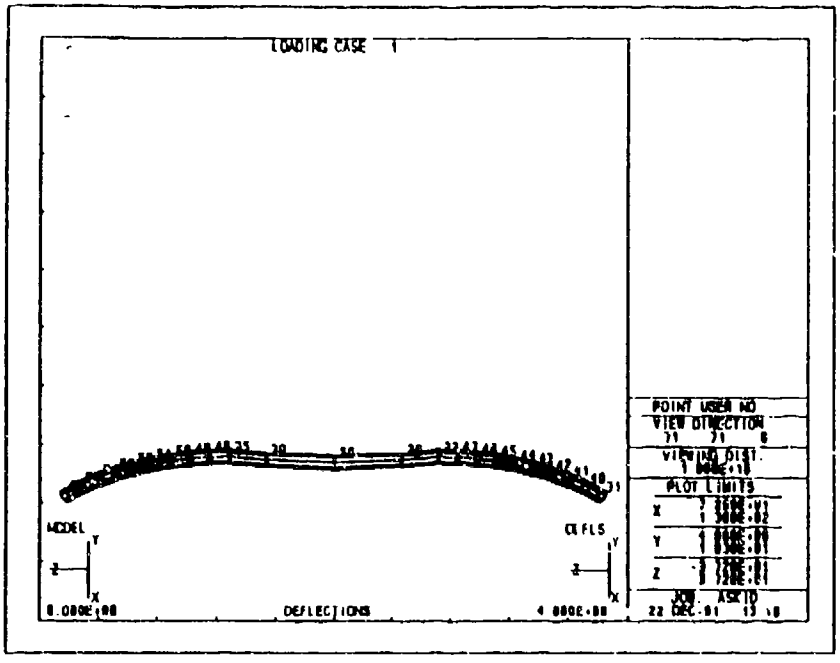


Figure D21.2: Deflected Crosstube

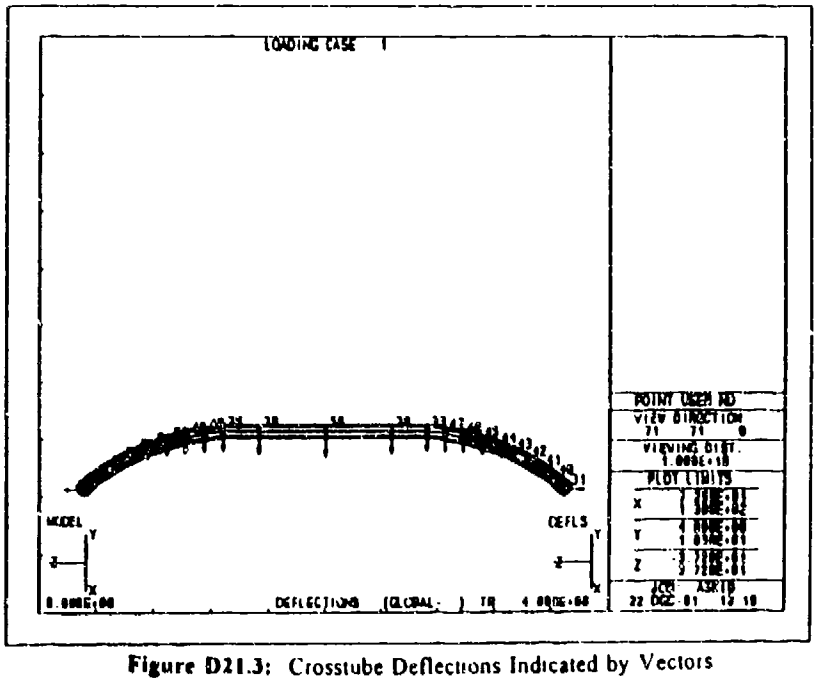


Figure D21.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-6.3055E+03
2	1	-1.1984E+04
3	1	-1.8285E+04
4	1	-2.5122E+04
5	1	-3.2410E+04
6	1	-4.0065E+04
7	1	-4.8001E+04
8	1	-5.6134E+04
9	1	-6.4398E+04
10	1	-6.4397E+04
11	1	-5.6135E+04
12	1	-4.8000E+04
13	1	-4.0065E+04
14	1	-3.2410E+04
15	1	-2.5121E+04
16	1	-1.8285E+04
17	1	-1.1985E+04
18	1	-6.3061E+03
19	1	-8.0370E+04
20	1	-8.0370E+04
21	1	-8.0371E+04
22	1	-8.0370E+04

Table D22.2: Principal Stresses

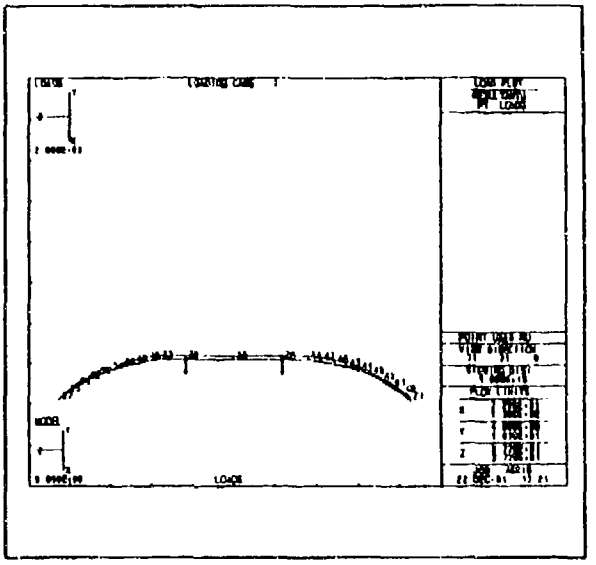


Figure D22.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
38	0.	-1.500E+03	0.
39	0.	-1.500E+03	0.

Table D22.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
31	0.000E+00	0.000E+00	-1.968E+00	1.689E-01	0.000E+00	0.000E+00
33	0.000E+00	-3.153E+00	1.108E-15	1.041E-01	0.000E+00	0.000E+00
35	0.000E+00	-3.153E+00	-9.337E-16	-1.041E-01	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	1.968E+00	-1.689E-01	0.000E+00	0.000E+00
38	0.000E+00	-3.637E+00	7.162E-16	7.044E-02	0.000E+00	0.000E+00
39	0.000E+00	-3.637E+00	-6.093E-16	-7.044E-02	0.000E+00	0.000E+00
40	0.000E+00	-3.072E-01	-1.598E+00	1.682E-01	0.000E+00	0.000E+00
41	0.000E+00	-6.426E-01	-1.260E+00	1.662E-01	0.000E+00	0.000E+00
42	0.000E+00	-1.000E+00	-9.561E-01	1.626E-01	0.000E+00	0.000E+00
43	0.000E+00	-1.373E+00	-6.918E-01	1.574E-01	0.000E+00	0.000E+00
44	0.000E+00	-1.752E+00	-4.694E-01	1.505E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.129E+00	-2.901E-01	1.418E-01	0.000E+00	0.000E+00
46	0.000E+00	-2.495E+00	-1.537E-01	1.312E-01	0.000E+00	0.000E+00
47	0.000E+00	-2.840E+00	-5.825E-02	1.187E-01	0.000E+00	0.000E+00
48	0.000E+00	-2.840E+00	5.825E-02	-1.187E-01	0.000E+00	0.000E+00
49	0.000E+00	-2.495E+00	1.537E-01	-1.312E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.129E+00	2.901E-01	-1.418E-01	0.000E+00	0.000E+00
51	0.000E+00	-1.752E+00	4.694E-01	-1.505E-01	0.000E+00	0.000E+00
52	0.000E+00	-1.373E+00	6.918E-01	-1.574E-01	0.000E+00	0.000E+00
53	0.000E+00	-1.000E+00	9.561E-01	-1.626E-01	0.000E+00	0.000E+00
54	0.000E+00	-6.426E-01	1.260E+00	-1.662E-01	0.000E+00	0.000E+00
55	0.000E+00	-3.072E-01	1.598E+00	-1.682E-01	0.000E+00	0.000E+00
56	0.000E+00	-3.998E+00	0.000E+00	-4.012E-11	0.000E+00	0.000E+00

Table D22.3: Deflections

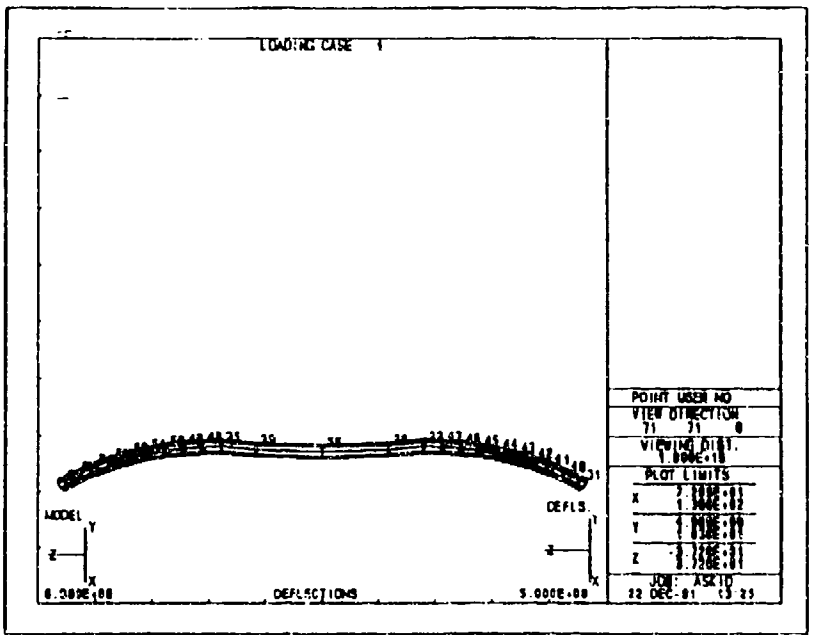


Figure D22.2: Deflected Crosstube

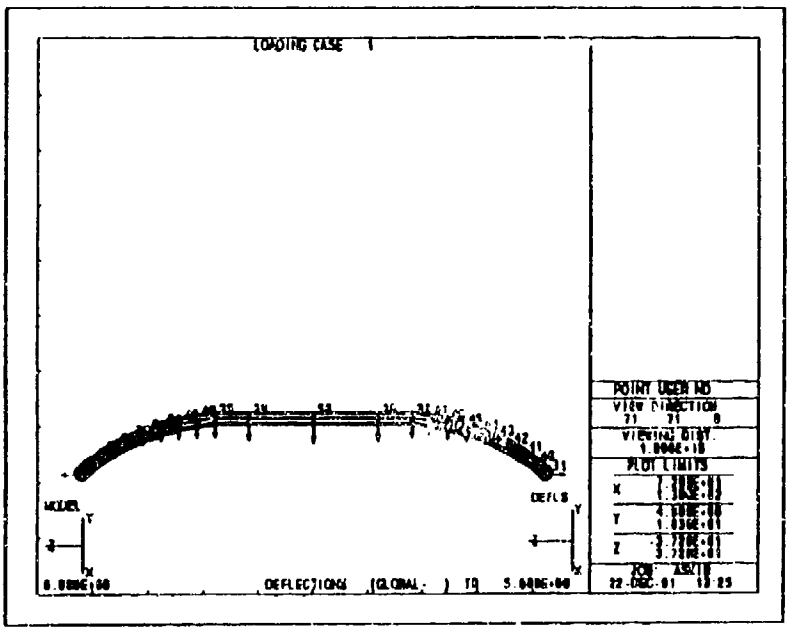


Figure D22.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-6.7257E+03
2	1	-1.2784E+04
3	1	-1.9504E+04
4	1	-2.6796E+04
5	1	-3.4571E+04
6	1	-4.2735E+04
7	1	-5.1201E+04
8	1	-5.9878E+04
9	1	-6.8690E+04
10	1	-6.8691E+04
11	1	-5.9878E+04
12	1	-5.1200E+04
13	1	-4.2736E+04
14	1	-3.4572E+04
15	1	-2.6796E+04
16	1	-1.9504E+04
17	1	-1.2784E+04
18	1	-6.7252E+03
19	1	-8.5729E+04
20	1	-8.5728E+04
21	1	-8.5729E+04
22	1	-8.5728E+04

Table D23.2: Principal Stresses

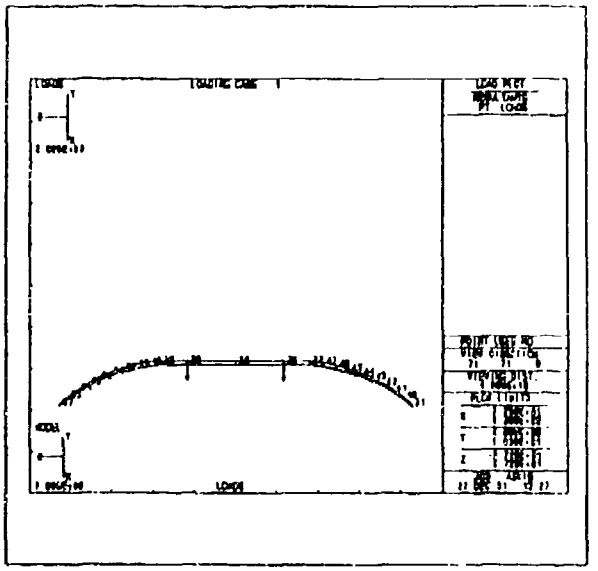


Figure D23.1: Point Location

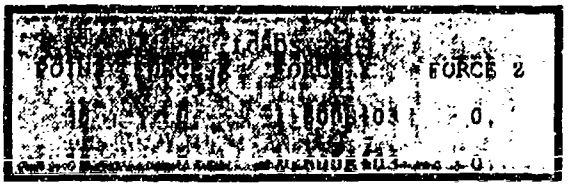


Table D23.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
31	0.000E+00	0.000E+00	-2.099E+00	1.801E-01	0.000E+00	0.000E+00
33	0.000E+00	-3.364E+00	1.178E-15	1.110E-01	0.000E+00	0.000E+00
35	0.000E+00	-3.364E+00	-9.897E-16	-1.110E-01	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	2.099E+00	-1.801E-01	0.000E+00	0.000E+00
38	0.000E+00	-3.879E+00	7.626E-16	7.514E-02	0.000E+00	0.000E+00
39	0.000E+00	-3.879E+00	-6.462E-16	-7.514E-02	0.000E+00	0.000E+00
40	0.000E+00	-3.277E-01	-1.705E+00	1.794E-01	0.000E+00	0.000E+00
41	0.000E+00	-6.855E-01	-1.344E+00	1.772E-01	0.000E+00	0.000E+00
42	0.000E+00	-1.067E+00	-1.020E+00	1.734E-01	0.000E+00	0.000E+00
43	0.000E+00	-1.464E+00	-7.380E-01	1.679E-01	0.000E+00	0.000E+00
44	0.000E+00	-1.869E+00	-5.007E-01	1.606E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.271E+00	-3.094E-01	1.513E-01	0.000E+00	0.000E+00
46	0.000E+00	-2.661E+00	-1.640E-01	1.400E-01	0.000E+00	0.000E+00
47	0.000E+00	-3.029E+00	-6.214E-02	1.266E-01	0.000E+00	0.000E+00
48	0.000E+00	-3.029E+00	6.214E-02	-1.266E-01	0.000E+00	0.000E+00
49	0.000E+00	-2.661E+00	1.640E-01	-1.400E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.271E+00	3.094E-01	-1.513E-01	0.000E+00	0.000E+00
51	0.000E+00	-1.869E+00	5.007E-01	-1.606E-01	0.000E+00	0.000E+00
52	0.000E+00	-1.464E+00	7.380E-01	-1.679E-01	0.000E+00	0.000E+00
53	0.000E+00	-1.067E+00	1.020E+00	-1.734E-01	0.000E+00	0.000E+00
54	0.000E+00	-6.855E-01	1.344E+00	-1.772E-01	0.000E+00	0.000E+00
55	0.000E+00	-3.277E-01	1.705E+00	-1.794E-01	0.000E+00	0.000E+00
56	0.000E+00	-4.264E+00	0.000E+00	-4.279E-11	0.000E+00	0.000E+00

Table D23.3: Deflections

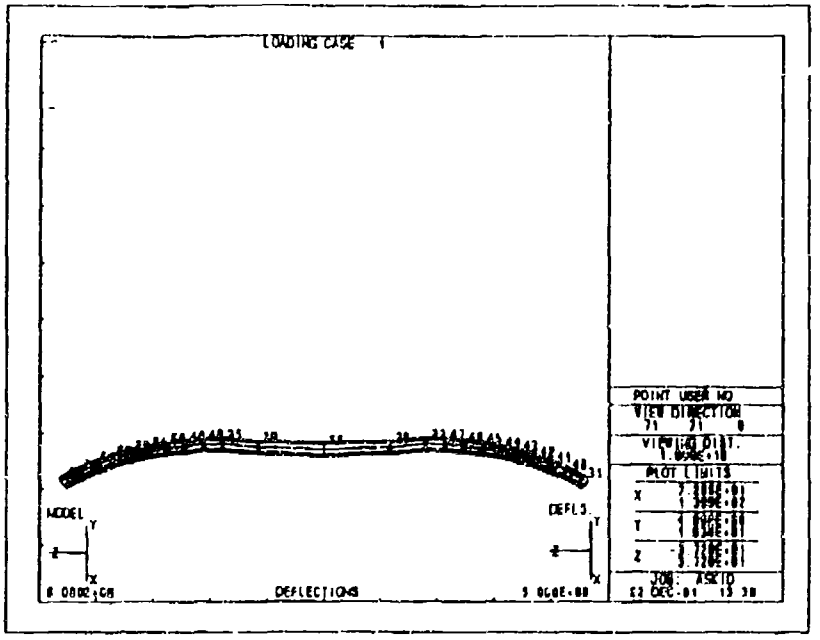


Figure D23.2: Deflected Crosstube

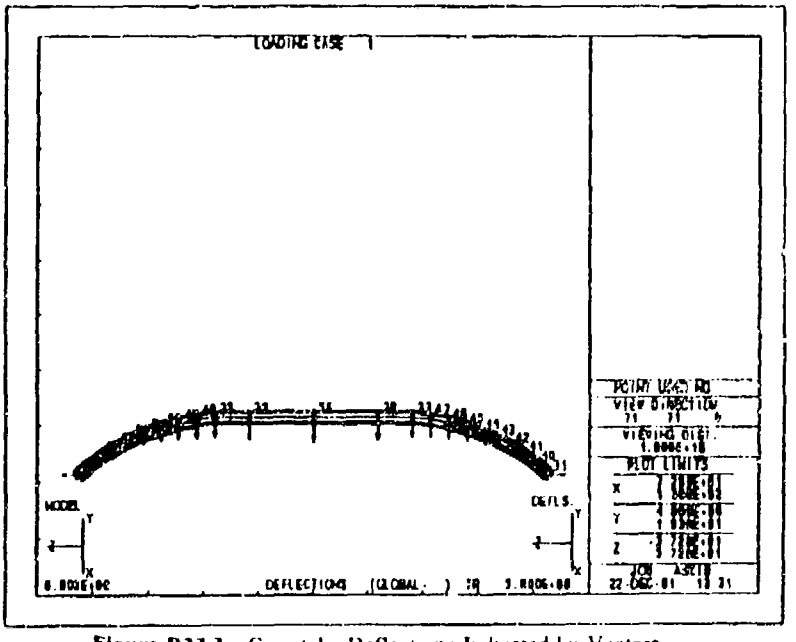


Figure D23.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-7.3564E+03
2	1	-1.3983E+04
3	1	-2.1333E+04
4	1	-2.9309E+04
5	1	-3.7812E+04
6	1	-4.6743E+04
7	1	-5.6001E+04
8	1	-6.5492E+04
9	1	-7.5131E+04
10	1	-7.5130E+04
11	1	-6.5492E+04
12	1	-5.6000E+04
13	1	-4.6743E+04
14	1	-3.7812E+04
15	1	-2.9309E+04
16	1	-2.1332E+04
17	1	-1.3982E+04
18	1	-7.3562E+03
19	1	-9.3765E+04
20	1	-9.3765E+04
21	1	-9.3766E+04
22	1	-9.3766E+04

Table D24.2. Principal Stresses

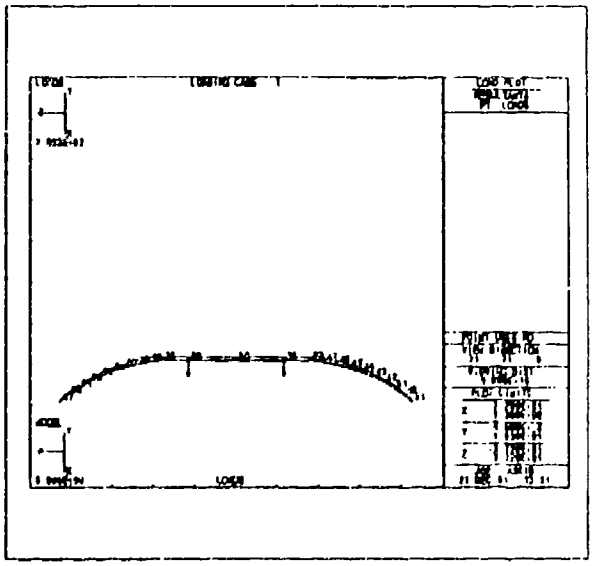


Figure D24.1: Point Location

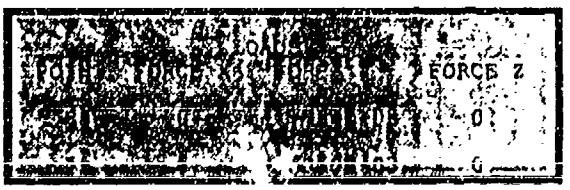


Table D24.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
31	0.000E+00	0.000E+00	-2.296E+00	1.970E-01	0.000E+00	0.000E+00
33	0.000E+00	-3.679E+00	1.288E-15	1.215E-01	0.000E+00	0.000E+00
35	0.000E+00	-3.679E+00	-1.086E-15	-1.215E-01	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	2.296E+00	-1.970E-01	0.000E+00	0.000E+00
38	0.000E+00	-4.243E+00	8.338E-16	8.218E-02	0.000E+00	0.000E+00
39	0.000E+00	-4.243E+00	-7.089E-16	-8.218E-02	0.000E+00	0.000E+00
40	0.000E+00	-3.584E-01	-1.865E+00	1.962E-01	0.000E+00	0.000E+00
41	0.000E+00	-7.497E-01	-1.470E+00	1.938E-01	0.000E+00	0.000E+00
42	0.000E+00	-1.167E+00	-1.115E+00	1.897E-01	0.000E+00	0.000E+00
43	0.000E+00	-1.602E+00	-8.071E-01	1.837E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.044E+00	-5.476E-01	1.756E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.484E+00	-3.385E-01	1.655E-01	0.000E+00	0.000E+00
46	0.000E+00	-2.911E+00	-1.793E-01	1.531E-01	0.000E+00	0.000E+00
47	0.000E+00	-3.313E+00	-6.796E-02	1.384E-01	0.000E+00	0.000E+00
48	0.000E+00	-3.313E+00	6.796E-02	-1.384E-01	0.000E+00	0.000E+00
49	0.000E+00	-2.911E+00	1.793E-01	-1.531E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.484E+00	3.385E-01	-1.655E-01	0.000E+00	0.000E+00
51	0.000E+00	-2.044E+00	5.476E-01	-1.756E-01	0.000E+00	0.000E+00
52	0.000E+00	-1.602E+00	8.071E-01	-1.837E-01	0.000E+00	0.000E+00
53	0.000E+00	-1.167E+00	1.115E+00	-1.897E-01	0.000E+00	0.000E+00
54	0.000E+00	-7.497E-01	1.470E+00	-1.938E-01	0.000E+00	0.000E+00
55	0.000E+00	-3.584E-01	1.865E+00	-1.962E-01	0.000E+00	0.000E+00
56	0.000E+00	-4.664E+00	0.000E+00	-4.680E-11	0.000E+00	0.000E+00

Table D24.3: Deflections

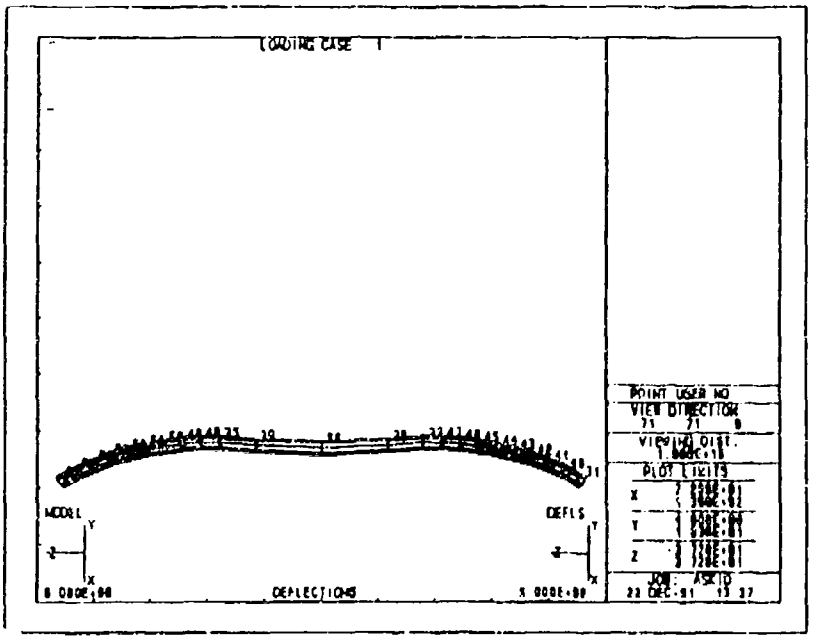


Figure D24.2: Deflected Crosstube

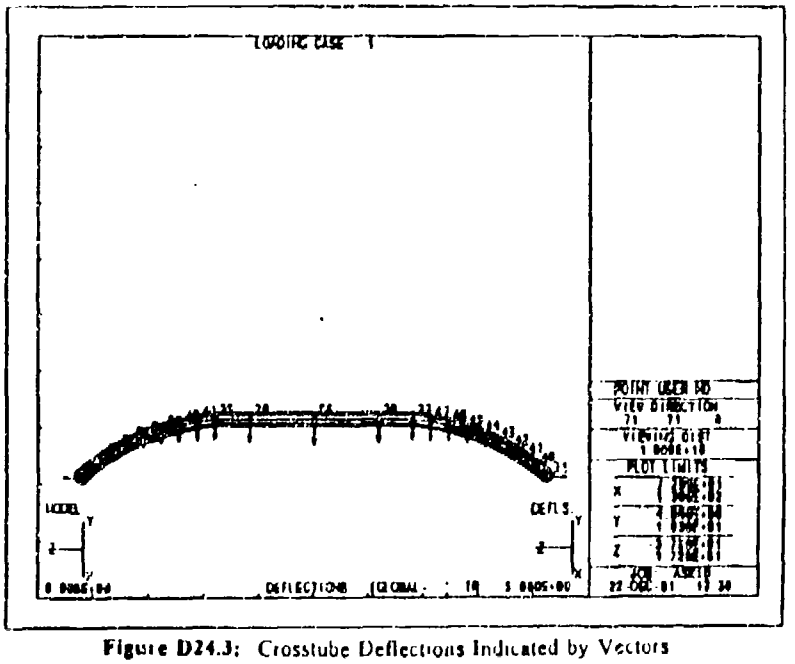


Figure D24.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-7.5675E+03
2	1	-1.4381E+04
3	1	-2.1943E+04
4	1	-3.0145E+04
5	1	-3.8893E+04
6	1	-4.8077E+04
7	1	-5.7601E+04
8	1	-6.7363E+04
9	1	-7.7276E+04
10	1	-7.7277E+04
11	1	-6.7362E+04
12	1	-5.7601E+04
13	1	-4.8077E+04
14	1	-3.8893E+04
15	1	-3.0147E+04
16	1	-2.1941E+04
17	1	-1.4381E+04
18	1	-7.5567E+03
19	1	-9.6445E+04
20	1	-9.6445E+04
21	1	-9.6444E+04
22	1	-9.6445E+04

Table D25.2: Principal Stresses

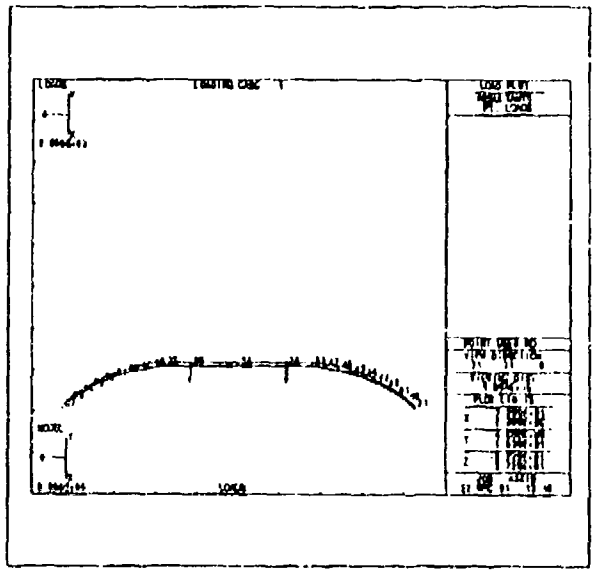


Figure D25.1: Point Location

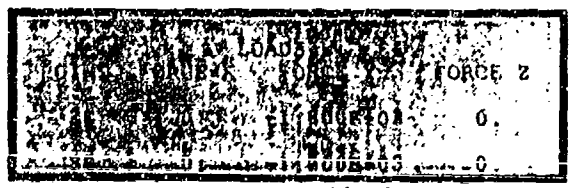


Table D25.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
31	0.000E+00	0.000E+00	-2.361E+00	2.026E-01	0.000E+00	0.000E+00
33	0.000E+00	-3.784E+00	1.324E-15	1.249E-01	0.000E+00	0.000E+00
35	0.000E+00	-3.784E+00	-1.116E-15	-1.249E-01	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	2.361E+00	-2.026E-01	0.000E+00	0.000E+00
38	0.000E+00	-4.364E+00	8.586E-16	8.453E-02	0.000E+00	0.000E+00
39	0.000E+00	-4.364E+00	-7.284E-16	-8.453E-02	0.000E+00	0.000E+00
40	0.000E+00	-3.666E-01	-1.918E+00	2.018E-01	0.000E+00	0.000E+00
41	0.000E+00	-7.711E-01	-1.512E+00	1.994E-01	0.000E+00	0.000E+00
42	0.000E+00	-1.200E+00	-1.147E+00	1.951E-01	0.000E+00	0.000E+00
43	0.000E+00	-1.547E+00	-8.302E-01	1.889E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.103E+00	-5.633E-01	1.807E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.555E+00	-3.481E-01	1.702E-01	0.000E+00	0.000E+00
46	0.000E+00	-2.994E+00	-1.845E-01	1.575E-01	0.000E+00	0.000E+00
47	0.000E+00	-3.406E+00	-6.990E-02	1.424E-01	0.000E+00	0.000E+00
48	0.000E+00	-3.406E+00	6.990E-02	-1.424E-01	0.000E+00	0.000E+00
49	0.000E+00	-2.994E+00	1.845E-01	-1.575E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.555E+00	3.481E-01	-1.702E-01	0.000E+00	0.000E+00
51	0.000E+00	-2.103E+00	5.633E-01	-1.807E-01	0.000E+00	0.000E+00
52	0.000E+00	-1.547E+00	8.302E-01	-1.889E-01	0.000E+00	0.000E+00
53	0.000E+00	-1.200E+00	1.147E+00	-1.951E-01	0.000E+00	0.000E+00
54	0.000E+00	-7.711E-01	1.512E+00	-1.994E-01	0.000E+00	0.000E+00
55	0.000E+00	-3.666E-01	1.918E+00	-2.018E-01	0.000E+00	0.000E+00
56	0.000E+00	-4.797E+00	0.000E+00	-4.614E-11	0.000E+00	0.000E+00

Table D25.3: Deflections

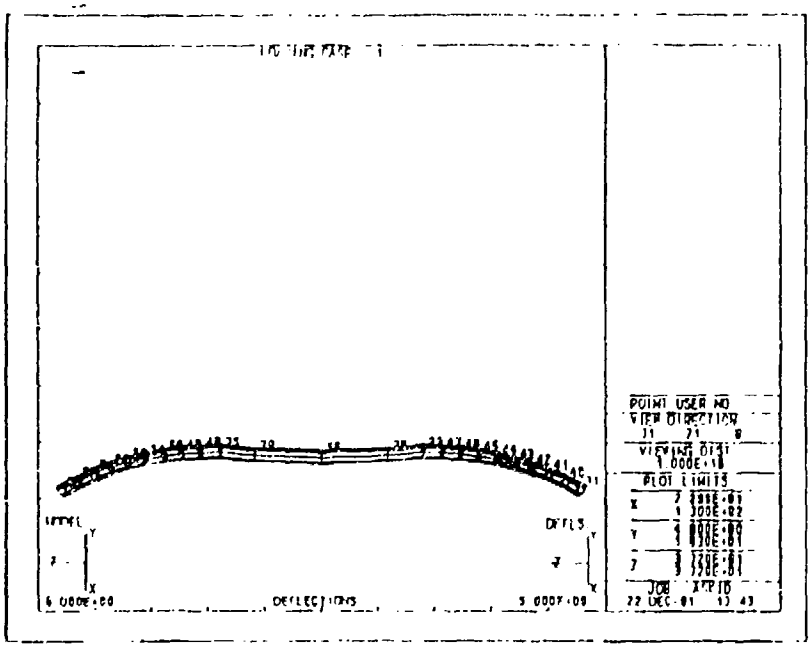


Figure D25.2: Deflected Crosstube

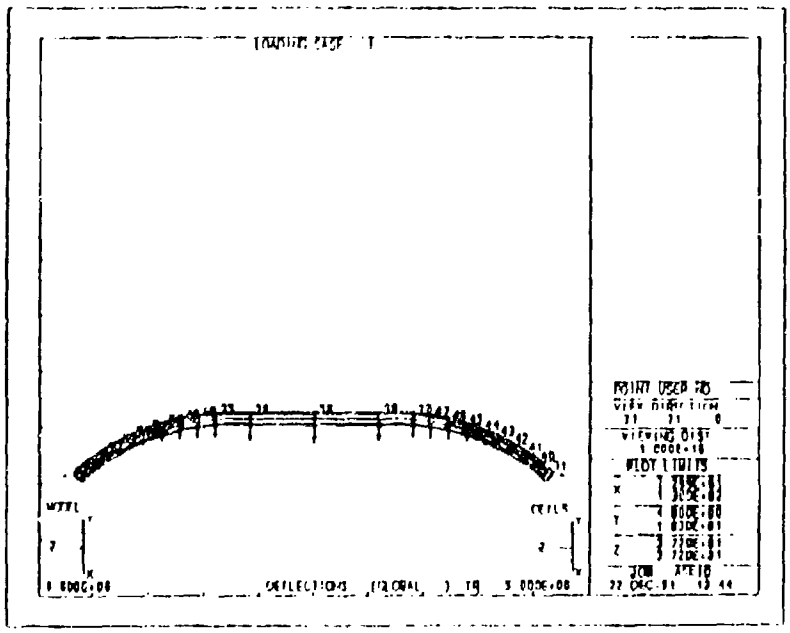


Figure D25.3: Crosstube Deflections Indicated by Vectors

PRINCIPAL STRESSES
ENVELOPE

ELE NO.	STR PT.	S11
1	1	-7.9029E+03
2	1	-1.5021E+01
3	1	-2.2917E+01
4	1	-3.1486E+01
5	1	-4.0621E+01
6	1	-5.0215E+01
7	1	-6.0159E+01
8	1	-7.0356E+01
9	1	-8.0712E+01
10	1	-8.0713E+04
11	1	-7.0356E+01
12	1	-6.0160E+01
13	1	-5.0214E+01
14	1	-4.0621E+01
15	1	-3.1485E+01
16	1	-2.2917E+01
17	1	-1.5021E+01
18	1	-7.9024E+03
19	1	-1.0073E+05
20	1	-1.0073E+05
21	1	-1.0073E+05
22	1	-1.0073E+05

Table D26.2: Principal Stresses

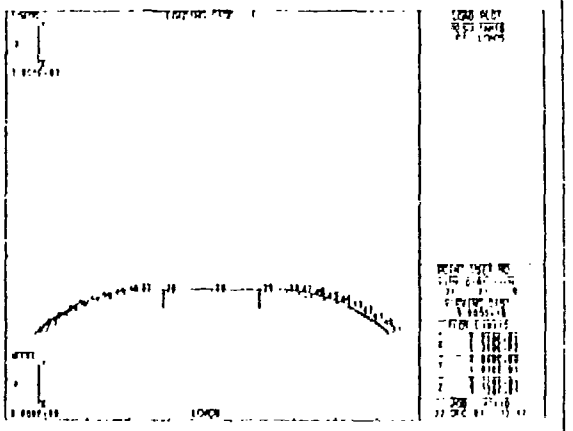


Figure D26.1: Point Location

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
38	0.	-1.880E+03	0.
39	0.	-1.880E+03	0.

Table D26.1: Applied Loads

DISPLACEMENT INFORMATION

POINT	U	V	W	RX	RY	RZ
31	0.000E+00	0.000E+00	-2.466E+00	2.116E-01	0.000E+00	0.000E+00
33	0.000E+00	-3.952E+00	1.388E-15	1.305E-01	0.000E+00	0.000E+00
35	0.000E+00	-3.952E+00	-1.168E-15	-1.305E-01	0.000E+00	0.000E+00
37	0.000E+00	0.000E+00	2.466E+00	-2.116E-01	0.000E+00	0.000E+00
38	0.000E+00	-4.558E+00	8.969E-16	8.829E-02	0.000E+00	0.000E+00
39	0.000E+00	-4.558E+00	-7.626E-16	-8.829E-02	0.000E+00	0.000E+00
10	0.000E+00	-3.850E-01	-2.003E+00	2.108E-01	0.000E+00	0.000E+00
41	0.000E+00	-8.054E-01	-1.579E+00	2.082E-01	0.000E+00	0.000E+00
42	0.000E+00	-1.254E+00	-1.198E+00	2.038E-01	0.000E+00	0.000E+00
43	0.000E+00	-1.721E+00	-8.671E-01	1.973E-01	0.000E+00	0.000E+00
44	0.000E+00	-2.196E+00	5.883E-01	1.887E-01	0.000E+00	0.000E+00
45	0.000E+00	-2.669E+00	-3.636E-01	1.778E-01	0.000E+00	0.000E+00
46	0.000E+00	-3.127E+00	-1.926E-01	1.645E-01	0.000E+00	0.000E+00
47	0.000E+00	-3.559E+00	-7.301E-02	1.487E-01	0.000E+00	0.000E+00
48	0.000E+00	-3.559E+00	7.301E-02	-1.487E-01	0.000E+00	0.000E+00
49	0.000E+00	-3.127E+00	1.926E-01	-1.645E-01	0.000E+00	0.000E+00
50	0.000E+00	-2.669E+00	3.636E-01	-1.778E-01	0.000E+00	0.000E+00
51	0.000E+00	-2.196E+00	5.883E-01	-1.887E-01	0.000E+00	0.000E+00
52	0.000E+00	-1.721E+00	8.671E-01	-1.973E-01	0.000E+00	0.000E+00
53	0.000E+00	-1.254E+00	1.198E+00	-2.038E-01	0.000E+00	0.000E+00
54	0.000E+00	-8.054E-01	1.579E+00	-2.082E-01	0.000E+00	0.000E+00
55	0.000E+00	-3.850E-01	2.003E+00	-2.108E-01	0.000E+00	0.000E+00
56	0.000E+00	-5.010E+00	0.000E+00	-5.028E-11	0.000E+00	0.000E+00

Table D26.3: Deflections

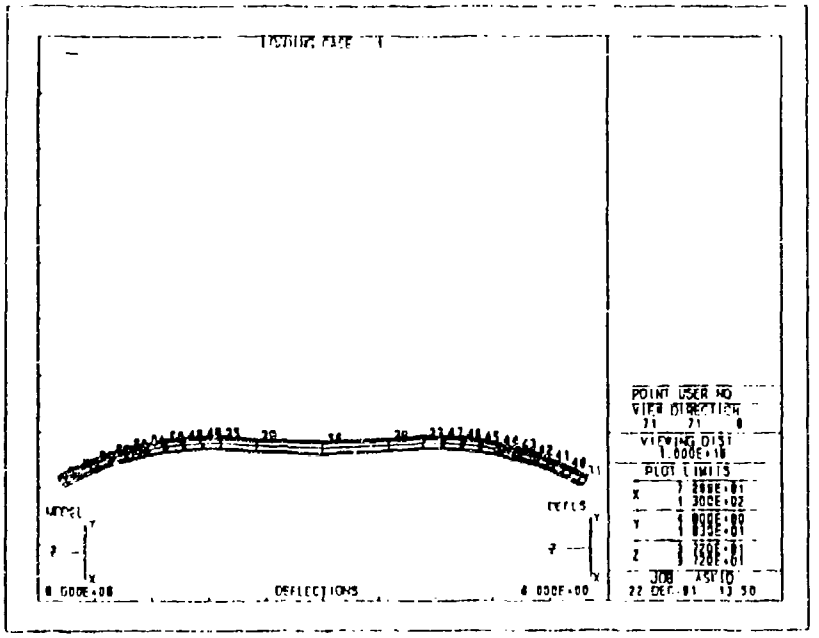


Figure D26.2: Deflected Crosstube

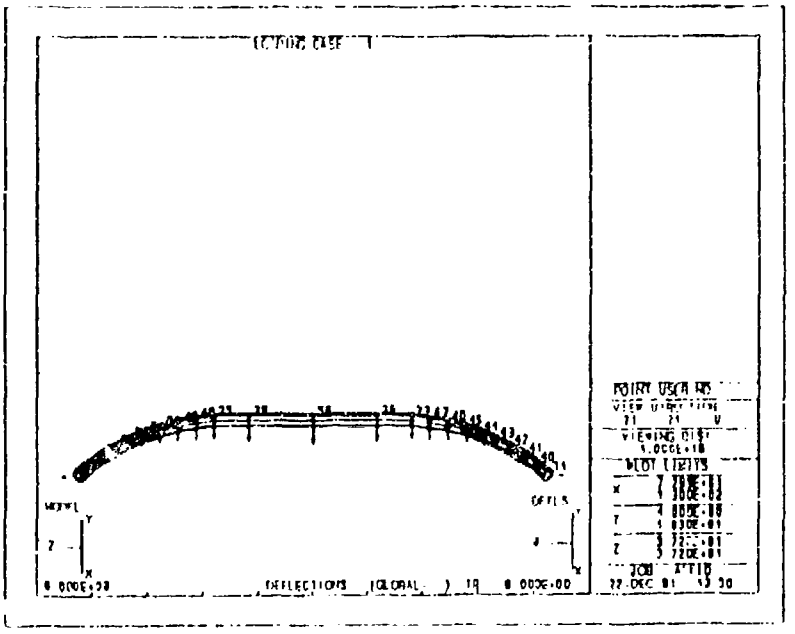


Figure D26.3: Crosstube Deflections Indicated by Vectors

Appendix E

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-2.000E+02	0.
30	0.	-2.000E+02	0.
112	0.	-1.550E+02	0.
115	0.	-2.000E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-3.525E-05	-3.578E-01	0.00
110	-7.836E-14	-3.603E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	1.904E+03	1.009E+04
100	-2.917E+02	1.041E+03
105	-3.579E+03	3.488E+03
105	-1.649E+03	3.261E+03
74	4.507E+01	1.518E+01
81	-7.040E+01	5.560E+01
66	-1.000E+02	6.503E+01
42	-1.062E+03	4.572E+01

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.000E+02	0.
30	0.	-4.000E+02	0.
112	0.	-1.550E+02	0.
115	0.	-4.000E+02	0.

DISPLACEMENT INFOPMATION

POINT	U	V	W
31	1.775E-04	-6.723E-01	0.00
110	-1.329E-13	-6.112E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-2.494E+03	1.694E+04
100	-4.952E+02	1.766E+03
105	-6.071E+03	5.866E+03
105	-2.813E+03	5.392E+03
74	-1.711E+02	8.084E+01
81	5.097E+02	3.284E+02
66	3.484E+02	2.793E+02
42	-1.996E+03	8.607E+01

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-6.000E+02	0.
30	0.	-5.850E+02	0.
112	0.	-1.550E+02	0.
115	0.	-5.200E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	4.984E-04	-9.546E-01	0.00
110	-1.743E-13	-8.015E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-4.856E+03	2.218E+04
100	-6.499E+02	2.316E+03
105	-8.001E+03	7.680E+03
105	-3.732E+03	7.035E+03
74	-5.186E+02	1.161E+02
81	1.324E+03	8.934E+02
66	1.085E+03	8.109E+02
42	-2.835E+03	1.221E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-8.000E+02	0.
30	0.	-5.850E+02	0.
112	0.	-1.550E+02	0.
115	0.	-5.200E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	7.648E-04	-1.084E+00	0.00
110	-1.863E-13	-8.564E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-4.506E+03	2.372E+04
100	-6.949E+02	2.475E+03
105	-8.601E+03	8.213E+03
105	-4.037E+03	7.536E+03
74	-8.204E+02	5.041E+01
81	1.964E+03	1.427E+03
66	1.732E+03	1.192E+03
42	-3.221E+03	1.387E+02

3200 lbs Aft Right, Center of Gravity

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-1.000E+03	0.
30	0.	-5.850E+02	0.
112	0.	-1.550E+02	0.
115	0.	-5.200E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	1.031E-03	-1.213E+00	0.00
110	-1.982E-13	-9.113E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-4.156E+03	2.526E+04
100	-7.398E+02	2.633E+03
105	-9.201E+03	8.746E+03
105	-4.343E+03	8.038E+03
74	-1.122E+03	2.010E+01
81	2.604E+03	1.960E+03
66	2.380E+03	1.571E+03
42	-3.605E+03	1.553E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-1.200E+03	0.
30	0.	-5.850E+02	0.
112	0.	-1.550E+02	0.
115	0.	-5.200E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	1.298E-03	-1.342E+00	0.00
110	-2.101E-13	-9.661E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-3.806E+03	2.680E+04
100	-7.831E+02	2.792E+03
105	-9.801E+03	9.279E+03
105	-4.648E+03	8.539E+03
74	-1.424E+03	8.821E+01
81	3.245E+03	2.489E+03
66	3.028E+03	1.951E+03
42	-3.991E+03	1.723E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-1.400E+03	0.
30	0.	-5.850E+02	0.
112	0.	-1.550E+02	0.
115	0.	-5.200E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	1.564E-03	-1.472E+00	0.00
110	-2.221E-13	-1.021E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-3.456E+03	2.834E+04
100	-8.263E+02	2.950E+03
105	-1.040E+04	9.812E+03
105	-4.954E+03	9.041E+03
74	-1.726E+03	1.563E+02
81	3.885E+03	3.021E+03
66	3.676E+03	2.332E+03
42	-4.377E+03	1.886E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-1.600E+03	0.
30	0.	-5.850E+02	0.
112	0.	-1.550E+02	0.
115	0.	-5.200E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	1.830E-03	-1.601E+00	0.00
110	-2.340E-13	-1.076E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-3.106E+03	2.988E+04
100	-8.712E+02	3.109E+03
105	-1.100E+04	1.034E+04
105	-5.259E+03	9.542E+03
74	-2.027E+03	2.221E+02
81	4.525E+03	3.551E+03
66	4.324E+03	2.708E+03
42	-4.763E+03	2.055E+02

3200 lbs Aft Right, Center of Gravity

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-1.800E+03	0.
30	0.	-5.850E+02	0.
112	0.	-1.550E+02	0.
115	0.	-5.200E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	2.097E-03	-1.730E+00	0.00
110	-2.459E-13	-1.131E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-2.755E+03	3.143E+04
100	-9.179E+02	3.267E+03
105	-1.160E+04	1.088E+04
105	-5.564E+03	1.004E+04
74	-2.329E+03	2.902E+02
81	5.165E+03	4.084E+03
66	4.971E+03	3.089E+03
42	-5.149E+03	2.221E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-1.945E+03	0.
30	0.	-5.850E+02	0.
112	0.	-1.550E+02	0.
115	0.	-5.200E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	2.290E-03	-1.824E+00	0.00
110	-2.546E-13	-1.171E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-2.503E+03	3.254E+04
100	-9.490E+02	3.383E+03
105	-1.204E+04	1.126E+04
105	-5.786E+03	1.041E+04
74	-2.548E+03	3.379E+02
81	5.629E+03	4.469E+03
66	5.441E+03	3.368E+03
42	-5.428E+03	2.342E+02

3200 lbs Aft Right, Center of Gravity

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-2.000E+02	0.
30	0.	-2.000E+02	0.
112	0.	-2.000E+02	0.
115	0.	-1.300E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	4.752E-06	-3.508E-01	0.00
110	-7.452E-14	-3.426E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	5.541E+03	9.703E+03
100	-2.774E+02	9.901E+02
105	-3.441E+03	3.351E+03
105	-1.595E+03	3.195E+03
74	-1.365E+01	2.395E+01
81	-1.156E+01	2.188E+00
66	3.453E+01	1.522E+01
42	-1.041E+03	4.492E+01

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.000E+02	0.
30	0.	-4.000E+02	0.
112	0.	-4.000E+02	0.
115	0.	-1.300E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	2.175E-04	-6.653E-01	0.00
110	-1.291E-13	-5.935E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	1.444E+04	1.696E+04
100	-4.814E+02	1.715E+03
105	-6.040E+03	5.850E+03
105	-2.829E+03	5.658E+03
74	-2.772E+02	8.850E+01
81	4.369E+02	3.456E+02
66	6.147E+02	3.987E+02
42	-1.974E+03	8.525E+01

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.850E+02	0.
30	0.	-6.000E+02	0.
112	0.	-5.450E+02	0.
115	0.	-1.300E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	3.651E-04	-8.900E-01	0.00
110	-1.684E-13	-7.741E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	2.090E+04	2.217E+04
100	-6.275E+02	2.237E+03
105	-7.909E+03	7.649E+03
105	-3.716E+03	7.432E+03
74	-4.600E+02	9.823E+01
81	7.482E+02	5.408E+02
66	1.017E+03	7.083E+02
42	-2.640E+03	1.139E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.850E+02	0.
30	0.	-8.000E+02	0.
112	0.	-5.450E+02	0.
115	0.	-1.300E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	6.316E-04	-1.019E+00	0.00
110	-1.803E-13	-8.289E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	2.131E+04	2.372E+04
100	-6.716E+02	2.395E+03
105	-8.507E+03	8.182E+03
105	-4.019E+03	7.935E+03
74	-7.588E+02	3.167E+01
81	1.396E+03	9.203E+02
66	1.657E+03	1.240E+03
42	-3.022E+03	1.303E+02

3200 lbs Aft Left, Center of Gravity

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.850E+02	0.
30	0.	-1.000E+03	0.
112	0.	-5.450E+02	0.
115	0.	-1.300E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	8.980E-04	-1.148E+00	0.00
110	-1.922E-13	-8.838E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	2.173E+04	2.526E+04
100	-7.156E+02	2.553E+03
105	-9.104E+03	8.716E+03
105	-4.322E+03	8.438E+03
74	-1.058E+03	3.727E+01
81	2.044E+03	1.300E+03
66	2.297E+03	1.772E+03
42	-3.403E+03	1.467E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.850E+02	0.
30	0.	-1.200E+03	0.
112	0.	-5.450E+02	0.
115	0.	-1.300E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	1.164E-03	-1.278E+00	0.00
110	-2.041E-13	-9.387E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	2.215E+04	2.681E+04
100	-7.606E+02	2.712E+03
105	-9.702E+03	9.250E+03
105	-4.625E+03	8.942E+03
74	-1.357E+03	1.050E+02
81	2.692E+03	1.679E+03
66	2.937E+03	2.305E+03
42	-3.784E+03	1.632E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.850E+02	0.
30	0.	-1.400E+03	0.
112	0.	-5.450E+02	0.
115	0.	-1.300E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	1.431E-03	-1.407E+00	0.00
110	-2.161E-13	-9.936E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	2.256E+04	2.835E+04
100	-8.072E+02	2.871E+03
105	-1.030E+04	9.783E+03
105	-4.929E+03	9.445E+03
74	-1.655E+03	.704E+02
81	3.339E+03	2.051E+03
66	3.577E+03	2.836E+03
42	-4.166E+03	1.796E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.850E+02	0.
30	0.	-1.600E+03	0.
112	0.	-5.450E+02	0.
115	0.	-1.300E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	1.697E-03	-1.536E+00	0.00
110	-2.280E-13	-1.048E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	2.298E+04	2.989E+04
100	-8.505E+02	3.029E+03
105	-1.090E+04	1.032E+04
105	-5.232E+03	9.948E+03
74	-1.954E+03	2.429E+02
81	3.987E+03	2.441E+03
66	4.217E+03	3.368E+03
42	-4.548E+03	1.959E+02

3200 lbs Aft Left, Center of Gravity

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.850E+02	0.
30	0.	-1.800E+03	0.
112	0.	-5.450E+02	0.
115	0.	-1.300E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	1.964E-03	-1.665E+00	0.00
110	-2.400E-13	-1.103E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	2.340E+04	3.144E+04
100	-8.937E+02	3.188E+03
105	-1.150E+04	1.085E+04
105	-5.535E+03	1.045E+04
74	-2.253E+03	3.059E+02
81	4.635E+03	2.820E+03
66	4.857E+03	3.902E+03
42	-4.930E+03	2.127E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.850E+02	0.
30	0.	-2.000E+03	0.
112	0.	-5.450E+02	0.
115	0.	-1.300E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	2.230E-03	-1.795E+00	0.00
110	-2.519E-13	-1.158E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	2.382E+04	3.298E+04
100	-9.369E+02	3.348E+03
105	-1.209E+04	1.138E+04
105	-5.838E+03	1.095E+04
74	-2.552E+03	3.760E+02
81	5.283E+03	3.202E+03
66	5.497E+03	4.431E+03
42	-5.312E+03	2.293E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.850E+02	0.
30	0.	-2.040E+03	0.
112	0.	-5.450E+02	0.
115	0.	-1.300E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	2.283E-03	-1.820E+00	0.00
110	-2.543E-13	-1.169E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	2.390E+04	3.329E+04
100	-9.490E+02	3.379E+03
105	-1.221E+04	1.149E+04
105	-5.899E+03	1.106E+04
74	-2.612E+03	3.896E+02
81	5.412E+03	3.273E+03
66	5.625E+03	4.538E+03
42	-5.387E+03	2.323E+02

3200 lbs Aft Left, Center of Gravity

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-2.000E+02	0.
30	0.	-2.000E+02	0.
112	0.	-2.000E+02	0.
115	0.	-2.000E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-1.073E-04	-3.704E-01	0.00
110	-8.527E-14	-3.920E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	3.733E+03	1.102E+04
100	-3.181E+02	1.133E+03
105	-3.894E+03	3.810E+03
105	-1.790E+03	3.589E+03
74	1.209E+02	2.912E-01
81	-2.593E+02	1.834E+02
66	-2.593E+02	1.835E+02
42	-1.100E+03	4.738E+01

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.000E+02	0.
30	0.	-4.000E+02	0.
112	0.	-4.000E+02	0.
115	0.	-4.000E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-2.145E-04	-7.408E-01	0.00
110	-1.705E-13	-7.841E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	7.466E+03	2.205E+04
100	-6.361E+02	2.265E+03
105	-7.788E+03	7.621E+03
105	-3.579E+03	7.179E+03
74	2.418E+02	5.824E-01
81	-5.185E+02	3.668E+02
66	-5.185E+02	3.671E+02
42	-2.199E+03	9.475E+01

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-6.000E+02	0.
30	0.	-6.000E+02	0.
112	0.	-5.600E+02	0.
115	0.	-5.600E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-1.938E-04	-1.089E+00	0.00
110	-2.435E-13	-1.120E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	1.061E+04	3.148E+04
100	-9.075E+02	3.236E+03
105	-1.114E+04	1.088E+04
105	-5.133E+03	1.025E+04
74	2.184E+02	1.169E+00
81	-4.684E+02	3.321E+02
66	-4.684E+02	3.319E+02
42	-3.232E+03	1.394E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-8.000E+02	0.
30	0.	-8.000E+02	0.
112	0.	-5.600E+02	0.
115	0.	-5.600E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	3.391E-04	-1.347E+00	0.00
110	-2.674E-13	-1.229E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	1.137E+04	3.457E+04
100	-9.957E+02	3.552E+03
105	-1.234E+04	1.195E+04
105	-5.741E+03	1.126E+04
74	-3.822E+02	8.504E-01
81	8.195E+02	5.799E+02
66	8.195E+02	5.807E+02
42	-3.999E+03	1.726E+02

3200 lbs Centerline, Center of Gravity

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-1.000E+03	0.
30	0.	-1.000E+03	0.
112	0.	-5.600E+02	0.
115	0.	-5.600E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	8.719E-04	-1.606E+00	0.00
110	-2.913E-13	-1.339E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	1.214E+04	3.765E+04
100	-1.086E+03	3.870E+03
105	-1.354E+04	1.302E+04
105	-6.350E+03	1.226E+04
74	-9.828E+02	4.815E-01
81	2.107E+03	1.492E+03
66	2.107E+03	1.491E+03
42	-4.767E+03	2.058E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-1.040E+03	0.
30	0.	-1.040E+03	0.
112	0.	-5.600E+02	0.
115	0.	-5.600E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	9.785E-04	-1.657E+00	0.00
110	-2.960E-13	-1.361E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	1.229E+04	3.827E+04
100	-1.105E+03	3.933E+03
105	-1.378E+04	1.323E+04
105	-6.472E+03	1.246E+04
74	-1.103E+03	1.363E+00
81	2.365E+03	1.675E+03
66	2.365E+03	1.674E+03
42	-4.921E+03	2.121E+02

3200 lbs Centerline, Center of Gravity

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-2.000E+02	0.
30	0.	-2.000E+02	0.
112	0.	-2.000E+02	0.
115	0.	-2.000E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-1.073E-04	-3.704E-01	0.00
110	-8.527E-14	-3.920E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	3.733E+03	1.102E+04
100	-3.181E+02	1.133E+03
105	-3.894E+03	3.810E+03
105	-1.790E+03	3.589E+03
74	1.209E+02	2.912E-01
81	-2.593E+02	1.834E+02
66	-2.593E+02	1.835E+02
42	-1.100E+03	4.738E+01

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-3.100E+02	0.
30	0.	-4.000E+02	0.
112	0.	-4.000E+02	0.
115	0.	-3.100E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-1.904E-04	-6.575E-01	0.00
110	-1.513E-13	-6.959E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	9.632E+03	1.966E+04
100	-5.644E+02	2.010E+03
105	-6.935E+03	6.791E+03
105	-3.192E+03	6.446E+03
74	2.046E+02	2.179E+00
81	-4.881E+02	3.679E+02
66	-4.323E+02	2.832E+02
42	-1.951E+03	8.420E+01

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-3.100E+02	0.
30	0.	-6.000E+02	0.
112	0.	-6.000E+02	0.
115	0.	-3.100E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-2.440E-04	-8.427E-01	0.00
110	-1.939E-13	-8.919E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	1.818E+04	2.537E+04
100	-7.243E+02	2.578E+03
105	-8.934E+03	8.757E+03
105	-4.120E+03	8.408E+03
74	2.428E+02	2.170E+00
81	-6.797E+02	5.564E+02
66	-5.000E+02	2.785E+02
42	-2.497E+03	1.077E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-3.100E+02	0.
30	0.	-8.000E+02	0.
112	0.	-8.000E+02	0.
115	0.	-3.100E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-2.977E-04	-1.028E+00	0.00
110	-2.366E-13	-1.088E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	2.673E+04	3.198E+04
100	-8.816E+02	3.143E+03
105	-1.093E+04	1.072E+04
105	-5.049E+03	1.037E+04
74	2.810E+02	2.162E+00
81	-8.713E+02	7.438E+02
66	-5.676E+02	2.761E+02
42	-3.046E+03	1.313E+02

3200 lbs Forward Left, Center of Gravity

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-3.100E+02	0.
30	0.	-1.000E+03	0.
112	0.	-1.000E+03	0.
115	0.	-3.100E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-3.513E-04	-1.213E+00	0.00
110	-2.792E-13	-1.284E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	3.527E+04	3.679E+04
100	-1.041E+03	3.709E+03
105	-1.293E+04	1.269E+04
105	-5.978E+03	1.233E+04
74	3.192E+02	4.542E+00
81	-1.063E+03	9.300E+02
66	-6.353E+02	2.713E+02
42	-3.593E+03	1.549E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-3.100E+02	0.
30	0.	-1.200E+03	0.
112	0.	-1.200E+03	0.
115	0.	-3.100E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-4.049E-04	-1.398E+00	0.00
110	-3.219E-13	-1.480E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	4.382E+04	4.250E+04
100	-1.198E+03	4.277E+03
105	-1.493E+04	1.465E+04
105	-6.907E+03	1.429E+04
74	3.574E+02	6.922E+00
81	-1.254E+03	1.120E+03
66	-7.029E+02	2.678E+02
42	-4.139E+03	1.789E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-3.100E+02	0.
30	0.	-1.290E+03	0.
112	0.	-1.290E+03	0.
115	0.	-3.100E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-4.291E-04	-1.482E+00	0.00
110	-3.411E-13	-1.568E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	4.767E+04	4.507E+04
100	-1.272E+03	4.530E+03
105	-1.583E+04	1.554E+04
105	-7.325E+03	1.518E+04
74	3.746E+02	7.038E+00
81	-1.341E+03	1.200E+03
66	-7.334E+02	2.630E+02
42	-4.382E+03	1.889E+02

3200 lbs Forward Left, Center of Gravity

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-2.000E+02	0.
30	0.	-2.000E+02	0.
112	0.	-2.000E+02	0.
115	0.	-2.000E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-1.073E-04	-3.704E-01	0.00
110	-8.527E-14	-3.920E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	3.733E+03	1.102E+04
100	-3.181E+02	1.133E+03
105	-3.894E+03	3.810E+03
105	-1.790E+03	3.589E+03
74	1.209E+02	2.912E-01
81	-2.593E+02	1.834E+02
66	-2.593E+02	1.835E+02
42	-1.100E+03	4.738E+01

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-4.000E+02	0.
30	0.	-3.700E+02	0.
112	0.	-3.700E+02	0.
115	0.	-4.000E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-2.065E-04	-7.131E-01	0.00
110	-1.641E-13	-7.547E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	6.184E+03	2.119E+04
100	-6.111E+02	2.181E+03
105	-7.488E+03	7.326E+03
105	-3.440E+03	6.884E+03
74	2.361E+02	2.525E-01
81	-4.896E+02	3.389E+02
66	-5.084E+02	3.671E+02
42	-2.117E+03	9.117E+01

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-6.000E+02	0.
30	0.	-3.700E+02	0.
112	0.	-3.700E+02	0.
115	0.	-6.000E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-2.601E-04	-8.983E-01	0.00
110	-2.068E-13	-9.507E-01	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	1.369E+03	2.650E+04
100	-7.710E+02	2.747E+03
105	-9.383E+03	9.170E+03
105	-4.301E+03	8.512E+03
74	3.188E+02	1.117E+00
81	-5.574E+02	3.349E+02
66	-7.000E+02	5.542E+02
42	-2.669E+03	1.153E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-8.000E+02	0.
30	0.	-3.700E+02	0.
112	0.	-3.700E+02	0.
115	0.	-8.000E+02	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-3.138E-04	-1.083E+00	0.00
110	-2.494E-13	-1.147E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-3.444E+03	3.182E+04
100	-9.300E+02	3.314E+03
105	-1.128E+04	1.105E+04
105	-5.161E+03	1.014E+04
74	4.015E+02	3.236E+00
81	-6.251E+02	3.310E+02
66	-8.916E+02	7.425E+02
42	-3.221E+03	1.389E+02

3200 lbs Forward Right, Center of Gravity

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-1.000E+03	0.
30	0.	-3.700E+02	0.
112	0.	-3.700E+02	0.
115	0.	-1.000E+03	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-3.674E-04	-1.269E+00	0.00
110	-2.920E-13	-1.343E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-8.259E+03	3.713E+04
100	-1.089E+03	3.880E+03
105	-1.317E+04	1.286E+04
105	-6.022E+03	1.177E+04
74	4.842E+02	2.935E+00
81	-6.928E+02	3.258E+02
66	-1.083E+03	9.307E+02
42	-3.774E+03	1.625E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-1.200E+03	0.
30	0.	-3.700E+02	0.
112	0.	-3.700E+02	0.
115	0.	-1.200E+03	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-4.210E-04	-1.454E+00	0.00
110	-3.346E-13	-1.539E+00	0.00

ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-1.307E+04	4.244E+04
100	-1.248E+03	4.446E+03
105	-1.507E+04	1.470E+04
105	-6.883E+03	1.340E+04
74	5.669E+02	6.218E+00
81	-7.604E+02	3.242E+02
66	-1.275E+03	1.118E+03
42	-4.324E+03	1.864E+02

LOADS

POINT	FORCE X	FORCE Y	FORCE Z
15	0.	-1.230E+03	0.
30	0.	-3.700E+02	0.
112	0.	-3.700E+02	0.
115	0.	-1.230E+03	0.

DISPLACEMENT INFORMATION

POINT	U	V	W
31	-4.291E-04	-1.482E+00	0.00
110	-3.411E-13	-1.568E+00	0.00

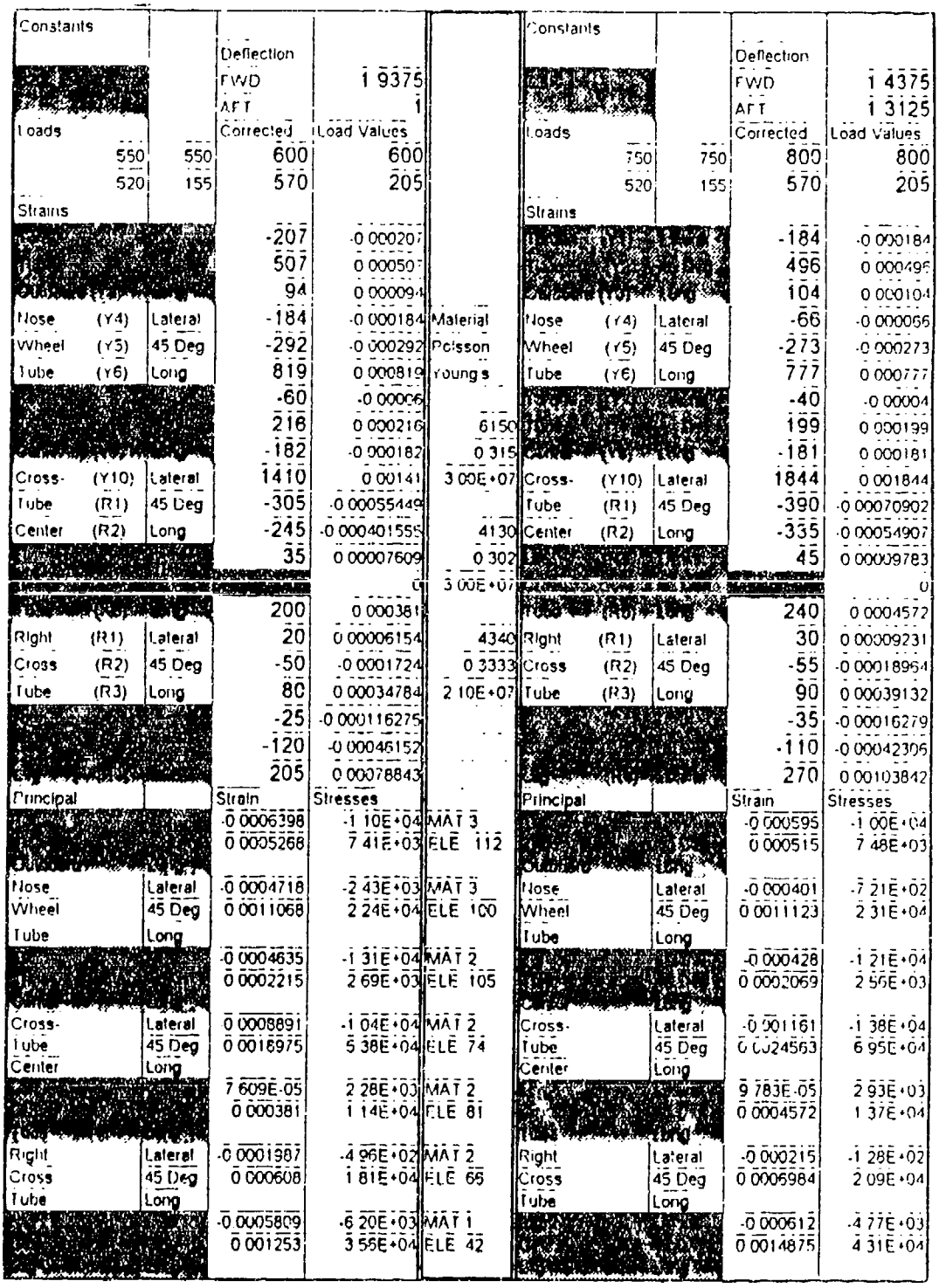
ELEM NO.	NORMAL STRESS	SHEAR STRESS
112	-1.379E+04	4.324E+01
100	-1.272E+03	4.530E+03
105	-1.535E+04	1.498E+04
105	-7.013E+03	1.364E+04
74	5.793E+02	5.159E+00
81	-7.706E+02	3.215E+02
66	-1.304E+03	1.147E+03
42	-4.408E+03	1.903E+02

3200 lbs Forward Right, Center of Gravity

Appendix F

Constants					Constants			
		Deflection					Deflection	
		FWD	0 75				FWD	1
		AFT	0 4375				AFT	0 65625
Loads		Corrected	Load Values		Loads		Corrected	Load Values
150	150	200	200		350	350	400	400
150	150	200	200		350	155	400	205
Strains					Strains			
		-25	-0 000025				-123	-0 000123
		205	0 000205				353	0 000353
		45	0 00004				75	0 000075
Nose (r4)	Lateral	-414	-0 00041	Material	Nose (r4)	Lateral	-427	-0 000427
Wheel (r5)	45 Deg	133	-0 000133	Poisson	Wheel (r5)	45 Deg	206	-0 000206
Tube (r6)	Long	380	0 0003	Youngs	Tube (r6)	Long	587	0 000587
		-25	-0 000025				-37	-0 000037
		-123	0 000123	6150			-157	0 000157
		-81	-0 000081	0 315			-134	-0 000134
Cross- (Y10)	Lateral	553	0 000553	3 00E+07	Cross (Y10)	Lateral	881	0 000881
Tube (R1)	45 Deg	105	-0 00019089		Tube (R1)	45 Deg	200	-0 0003636
Center (R2)	Long	-90	-0 00014751	4130	Center (R2)	Long	-145	-0 00023766
		10	0 00002174	0 302			20	0 00004348
			0	3 00E+07				0
		110	0 00020055				150	0 00028575
Right (R1)	Lateral	5	0 000015385	4340	Right (R1)	Lateral	15	4 6155E-05
Cross (R2)	45 Deg	30	-0 00010344	0 3333	Cross (R2)	45 Deg	40	-0 00013792
Tube (R3)	Long	45	0 00019569	2 10E+07	Tube (R3)	Long	65	0 00028262
		0	0				-15	-6 9765E 05
		35	-0 00013461				55	-0 00021153
		75	0 00028845				135	0 00051921
Principal		Strain	Stresses		Principal		Strain	Stresses
		-0 0001881	-2 81E+03	MAT 3			-0 000414	-6 90E+03
		0 0002081	3 44E+03	ELE 112			0 0003658	5 38E+03
Nose	Lateral	-0 0004306	-7 05E+03	MAT 3	Nose	Lateral	-0 000502	-6 65E+03
Wheel	45 Deg	0 0003966	5 98E+03	ELE 100	Wheel	45 Deg	0 0006621	1 17E+04
Tube	Long				Tube	Long		
		-0 0002312	-6 38E+03	MAT 2			-0 000333	-9 37E+03
		0 0001252	1 83E+03	ELE 105			0 0001618	2 02E+03
Cross-	Lateral	-0 0003242	-3 43E+03	MAT 2	Cross-	Lateral	-0 000563	-6 56E+03
Tube	45 Deg	0 0007296	2 09E+04	ELE 74	Tube	45 Deg	0 0012062	3 42E+04
Center	Long				Center	Long		
		2 174E 05	6 52E+02	MAT 2			4 348E 05	1 30E+03
		0 0002096	6 29E+03	ELE 81			0 0002858	8 57E+03
Right	Lateral	-0 0001221	-7 08E+02	MAT 2	Right	Lateral	-0 00016	-4 14E+02
Cross	45 Deg	0 0003331	9 78E+03	ELE 66	Cross	45 Deg	0 000489	1 45E+04
Tube	Long				Tube	Long		
		-0 0001697	-8 45E+02	MAT 1			-0 000302	-2 17E+03
		0 0004582	1 35E+04	ELE 42			0 0007511	2 18E+04

3200 lbs Aft Right, Center of Gravity



Constants		Deflection			Constants		Deflection	
		FWD	1 9375				FWD	1 4375
		AFT	1				AFT	1 3125
Loads		Corrected	Load Values		Loads		Corrected	Load Values
550	550	600	600		750	750	800	800
520	155	570	205		520	155	570	205
Strains					Strains			
		-207	-0 000207				-184	-0 000184
		507	0 000507				496	0 000496
		94	0 000094				104	0 000104
Nose (Y4)	Lateral	-184	-0 000184	Material	Nose (Y4)	Lateral	-66	-0 000066
Wheel (Y5)	45 Deg	-292	-0 000292	Poisson	Wheel (Y5)	45 Deg	-273	-0 000273
Tube (Y6)	Long	819	0 000819	Youngs	Tube (Y6)	Long	777	0 000777
		-60	-0 00006				-40	-0 00004
		216	0 000216	6150			199	0 000199
		-182	-0 000182	0 315			-181	0 000181
Cross- (Y10)	Lateral	1410	0 00141	3 00E+07	Cross- (Y10)	Lateral	1844	0 001844
Tube (R1)	45 Deg	-305	-0 00055449		Tube (R1)	45 Deg	-390	-0 00070902
Center (R2)	Long	-245	-0 00040155	4130	Center (R2)	Long	-335	-0 00054907
		35	0 00007609	0 302			45	0 00009783
				3 00E+07				0
		200	0 000381				240	0 0004572
Right (R1)	Lateral	20	0 00006154	4340	Right (R1)	Lateral	30	0 00009231
Cross (R2)	45 Deg	-50	-0 0001724	0 3333	Cross (R2)	45 Deg	-55	-0 00018964
Tube (R3)	Long	80	0 00034784	2 10E+07	Tube (R3)	Long	90	0 00039132
		-25	-0 000116275				-35	-0 00016279
		-120	-0 00046152				-110	-0 00042306
		205	0 00078843				270	0 00103842
Principal		Strain	Stresses		Principal		Strain	Stresses
		-0 0006398	-1 10E+04	MAT 3			-0 000595	-1 00E+04
		0 0005268	7 41E+03	ELE 112			0 000515	7 48E+03
Nose	Lateral	-0 0004718	-2 43E+03	MAT 3	Nose	Lateral	-0 000401	-7 21E+02
Wheel	45 Deg	0 0011068	2 24E+04	ELE 100	Wheel	45 Deg	0 0011123	2 31E+04
Tube	Long				Tube	Long		
		-0 0004635	-1 31E+04	MAT 2			-0 000428	-1 21E+04
		0 0002215	2 69E+03	ELE 105			0 0002069	2 56E+03
Cross-	Lateral	0 0008891	-1 04E+04	MAT 2	Cross-	Lateral	-0 001161	-1 38E+04
Tube	45 Deg	0 0016975	5 38E+04	ELE 74	Tube	45 Deg	0 0024563	6 95E+04
Center	Long				Center	Long		
		7 609E-05	2 28E+03	MAT 2			9 783E-05	2 93E+03
		0 000381	1 14E+04	ELE 81			0 0004572	1 37E+04
Right	Lateral	-0 0001387	-4 96E+02	MAT 2	Right	Lateral	-0 000215	-1 28E+02
Cross	45 Deg	0 000608	1 81E+04	ELE 65	Cross	45 Deg	0 0006984	2 09E+04
Tube	Long				Tube	Long		
		-0 0005809	-6 20E+03	MAT 1			-0 000612	-4 77E+03
		0 001253	3 56E+04	ELE 42			0 0014875	4 31E+04

3200 lbs Aft Right, Center of Gravity

Constants			Deflection			Constants			Deflection	
[illegible]			FWD	1 59375		[illegible]			FWD	1 625
[illegible]			AFT	1 5625		[illegible]			AFT	1 5625
Loads			Corrected	Load Values		Loads			Corrected	Load Values
	950	585	1000	635			1150	585	1200	635
	520	155	570	205			520	155	570	205
Strains						Strains				
[illegible]			-164	-0 000164		[illegible]			-153	0 000153
[illegible]			494	0 000494		[illegible]			491	0 000491
[illegible]			103	0 000103		[illegible]			102	0 000102
Nose	(Y4)	Lateral	-135	-0 000135	Material	Nose	(Y4)	Lateral	-96	-0 000096
Wheel	(Y5)	45 Deg	-272	0 000272	Poisson	Wheel	(Y5)	45 Deg	-266	0 000266
Tube	(Y6)	Long	763	0 000763	rorings	Tube	(Y6)	Long	746	0 000746
[illegible]			-30	-0 00003		[illegible]			-27	-0 000027
[illegible]			193	0 000193	6150	[illegible]			191	0 000191
[illegible]			-180	-0 00018	0 315	[illegible]			-178	-0 000178
Cross-	(Y10)	Lateral	2129	0 002129	3 00E+07	Cross	(Y10)	Lateral	2157	0 002157
Tube	(R1)	45 Deg	-455	0 00082719		Tube	(R1)	45 Deg	-460	0 0008 3628
Center	(R2)	Long	-400	0 0006556	4130	Center	(R2)	Long	-405	0 0006638
[illegible]			60	0 0001304	0 302	[illegible]			60	0 0001304
[illegible]				0	3 00E+07	[illegible]				0
[illegible]			260	0 0004953		[illegible]			260	0 0004953
Right	(R1)	Lateral	40	0 0001230	4340	Right	(R1)	Lateral	35	0 0001077
Cross	(R2)	45 Deg	-65	-0 00022412	0 3333	Cross	(R2)	45 Deg	-60	0 0002068
Tube	(R3)	Long	95	0 00041306	2 10E+07	Tube	(R3)	Long	95	0 00041306
[illegible]			-50	-0 00023255		[illegible]			-55	0 00025581
[illegible]			-135	-0 00051921		[illegible]			-135	0 00051921
[illegible]			235	0 00090381		[illegible]			340	0 0013076
Principal			Strain	Stresses		Principal			Strain	Stresses
[illegible]			-0 0005717	-9 49E+03	MAT 3	[illegible]			-0 000558	-9 18E+03
[illegible]			0 0005107	7 56E+03	ELE 112	[illegible]			0 0005065	7 58E+03
Nose		Lateral	-0 0004242	-1 74E+03	MAT 3	Nose		Lateral	-0 000401	-1 19E+03
Wheel		45 Deg	0 0010522	2 15E+04	ELE 100	Wheel		45 Deg	0 0010506	2 17E+04
Tube		Long				Tube		Long		
[illegible]			-0 0004123	-1 16E+04	MAT 2	[illegible]			-0 000406	-1 14E+04
[illegible]			0 0002023	2 57E+03	ELE 105	[illegible]			0 0002006	2 58E+03
Cross-		Lateral	-0 0013572	-1 56E+04	MAT 2	Cross-		Lateral	-0 001373	1 68E+04
Tube		45 Deg	0 0028306	7 99E+04	ELE 74	Tube		45 Deg	0 0028667	8 09E+04
Center		Long				Center		Long		
[illegible]			0 0001304	3 91E+03	MAT 2	[illegible]			0 0001304	3 91E+03
[illegible]			0 0004953	1 49E+04	ELE 81	[illegible]			0 0004953	1 49E+04
Right		Lateral	-0 000245	-3 91E+02	MAT 2	Right		Lateral	-0 000231	-1 35E+03
Cross		45 Deg	0 0007812	2 33E+04	ELE 66	Cross		45 Deg	0 0007519	2 25E+04
Tube		Long				Tube		Long		
[illegible]			-0 0006908	-8 72E+03	MAT 1	[illegible]			0 000779	-6 74E+03
[illegible]			0 0013621	3 81E+04	ELE 42	[illegible]			0 0018311	5 28E+04

3200 lbs Aft Right, Center of Gravity

Constants					Constants			
		Deflection					Deflection	
[redacted]		FWD	1.625		[redacted]		FWD	1.6875
		AFT	1.625				AFT	1.875
Loads		Corrected	Load Values		Loads		Corrected	Load Values
1350	585	1400	635		1550	585	1600	635
520	155	570	205		520	155	570	205
Strains					Strains			
[redacted]		-163	-0.000163		[redacted]		-176	-0.000176
		490	0.00049				475	0.000475
		103	0.000103				100	0.0001
Nose (Y4)	Lateral	-141	-0.000141	Material	Nose (Y4)	Lateral	-163	-0.000163
Wheel (Y5)	45 Deg	-262	-0.000262	Poisson	Wheel (Y5)	45 Deg	-261	-0.000261
Tube (Y6)	Long	742	0.000742	Youngs	Tube (Y6)	Long	761	0.000761
[redacted]		-25	-0.000025		[redacted]		-35	-0.000035
		189	0.000189	6150			183	0.000183
		-179	-0.000179	0.315			-175	-0.000175
Cross- (Y10)	Lateral	2326	0.002326	3.00E+07	Cross- (Y10)	Lateral	2583	0.002583
Tube (R1)	45 Deg	-495	-0.00089991		Tube (R1)	45 Deg	-560	-0.00101808
Center (R2)	Long	-430	-0.00070477	4130	Center (R2)	Long	-495	-0.00081131
[redacted]		60	0.00013044	0.302	[redacted]		70	0.00015218
			0	3.00E+07				0
		270	0.00051435				275	0.00052388
Right (R1)	Lateral	45	0.000138465	4340	Right (R1)	Lateral	45	0.00013847
Cross (R2)	45 Deg	-65	-0.00022412	0.3333	Cross (R2)	45 Deg	-65	-0.00022412
Tube (R3)	Long	100	0.0004348	2.10E+07	Tube (R3)	Long	100	0.0004348
[redacted]		-60	-0.00027906		[redacted]		-65	-0.00030232
		-250	-0.0009615				-165	-0.00063459
		370	0.00142302				415	0.00159609
Principal		Strain	Stresses		Principal		Strain	Stresses
[redacted]		-0.0005667	-9.40E+03	MAT 3	[redacted]		-0.000569	-9.56E+03
		0.0005067	7.51E+03	ELE 112			0.0004932	7.17E+03
Nose	Lateral	-0.0004146	-1.80E+03	MAT 3	Nose	Lateral	-0.000427	-2.02E+03
Wheel	45 Deg	0.0010156	2.07E+04	ELE 100	Wheel	45 Deg	0.001025	2.09E+04
Tube	Long				Tube	Long		
[redacted]		-0.000403	-1.13E+04	MAT 2	[redacted]		-0.000401	-1.13E+04
		0.000199	2.55E+03	ELE 105			0.0001914	2.32E+03
Cross-	Lateral	-0.0014746	-1.78E+04	MAT 2	Cross-	Lateral	-0.001665	-2.07E+04
Tube	45 Deg	0.0030958	8.75E+04	ELE 74	Tube	45 Deg	0.0034364	9.68E+04
Center	Long				Center	Long		
[redacted]		0.0001304	3.91E+03	MAT 2	[redacted]		0.0001522	4.57E+03
		0.0005144	1.54E+04	ELE 81			0.0005239	1.57E+04
Right	Lateral	-0.0002452	6.58E+01	MAT 2	Right	Lateral	-0.000245	6.58E+01
Cross	45 Deg	0.0008184	2.46E+04	ELE 66	Cross	45 Deg	0.0008184	2.46E+04
Tube	Long				Tube	Long		
[redacted]		-0.0011818	-1.50E+04	MAT 1	[redacted]		-0.000948	-8.05E+03
		0.0023258	8.51E+04	ELE 42			0.0022416	6.47E+04

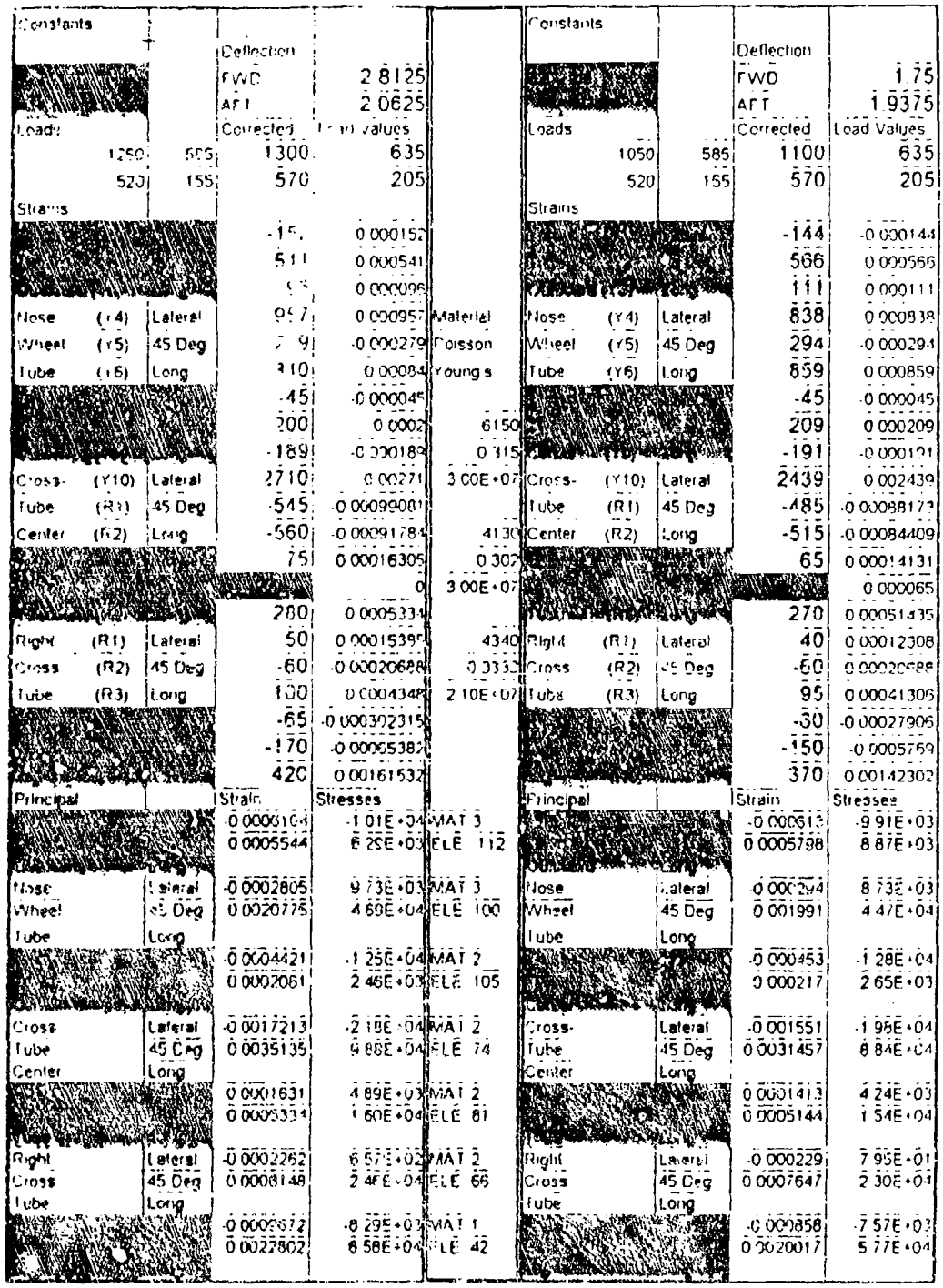
3200 lbs Aft Right, Center of Gravity

Constants					Constants			
		Deflection					Deflection	
		FWD	1.75				FWD	1.875
		AFT	2.0625				AFT	2.25
Loads		Corrected	Load Values		Loads		Corrected	Load Values
1750	585	1900	635		1945	585	1995	635
520	155	570	205		520	155	570	205
Strains					Strains			
		165	-0.000165				-152	-0.000152
		507	0.000507				510	0.00051
		97	0.000097				87	0.000087
Nose (Y4)	Lateral	1192	0.001192	Material	Nose (Y4)	Lateral	1037	0.001037
Wheel (Y5)	45 Deg	-265	-0.000265	Poisson	Wheel (Y5)	45 Deg	-261	-0.000261
Tube (Y6)	Long	781	0.000781	Young's	Tube (Y6)	Long	781	0.000781
		-34	-0.000034				-38	-0.000038
		185	0.000185	6150			187	0.000187
		-181	-0.000181	0.315			-181	-0.000181
Cross- (Y10)	Lateral	2802	0.002802	3.00E+07	Cross- (Y10)	Lateral	2973	0.002973
Tube (R1)	45 Deg	-595	-0.00108171		Tube (R1)	45 Deg	-615	-0.00111807
Center (R2)	Long	-550	-0.00090145	4130	Center (R2)	Long	-615	-0.00100799
		75	0.00016305	0.302			80	0.00017392
			0	3.00E+07				0
		285	0.000542025				290	0.00055245
Right (R1)	Lateral	50	0.00015385	4340	Right (R1)	Lateral	55	0.00016924
Cross (R2)	45 Deg	-60	-0.00020688	0.3333	Cross (R2)	45 Deg	-55	-0.00018964
Tube (R3)	Long	100	0.0004348	2.10E+07	Tube (R3)	Long	100	0.0004348
		-75	-0.000348825				-80	-0.00037208
		-205	-0.00078843				-200	-0.0007692
		465	0.00178839				490	0.00188454
Principal		Strain	Stresses		Principal		Strain	Stresses
		-0.0005906	-9.84E+03	MAT 3			-0.000588	-9.77E+03
		0.0005226	7.70E+03	ELE 112			0.000523	7.73E+03
Nose	Lateral	-0.0002818	1.11E+04	MAT 3	Nose	Lateral	-0.000268	1.01E+04
Wheel	45 Deg	0.0022548	5.10E+04	ELE 100	Wheel	45 Deg	0.002086	4.72E+04
Tube	Long				Tube	Long		
		-0.0004091	-1.16E+04	MAT 2			-0.000414	-1.17E+04
		0.0001941	2.33E+03	ELE 105			0.0001955	2.32E+03
Cross-	Lateral	-0.0017989	-2.25E+04	MAT 2	Cross-	Lateral	-0.001911	-2.45E+04
Tube	45 Deg	0.0036994	1.04E+05	ELE 74	Tube	45 Deg	0.0038764	1.09E+05
Center	Long				Center	Long		
		0.0001631	4.89E+03	MAT 2			0.0001739	5.22E+03
		0.0005429	1.63E+04	ELE 81			0.0005525	1.66E+04
Right	Lateral	-0.0002262	6.57E+02	MAT 2	Right	Lateral	-0.000207	1.25E+03
Cross	45 Deg	0.0008148	2.46E+04	ELE 66	Cross	45 Deg	0.0008113	2.47E+04
Tube	Long				Tube	Long		
		-0.0011286	-1.06E+04	MAT 1			-0.001141	-1.02E+04
		0.0025682	7.37E+04	ELE 42			0.0026536	7.64E+04

3200 lbs Aft Right, Center of Gravity

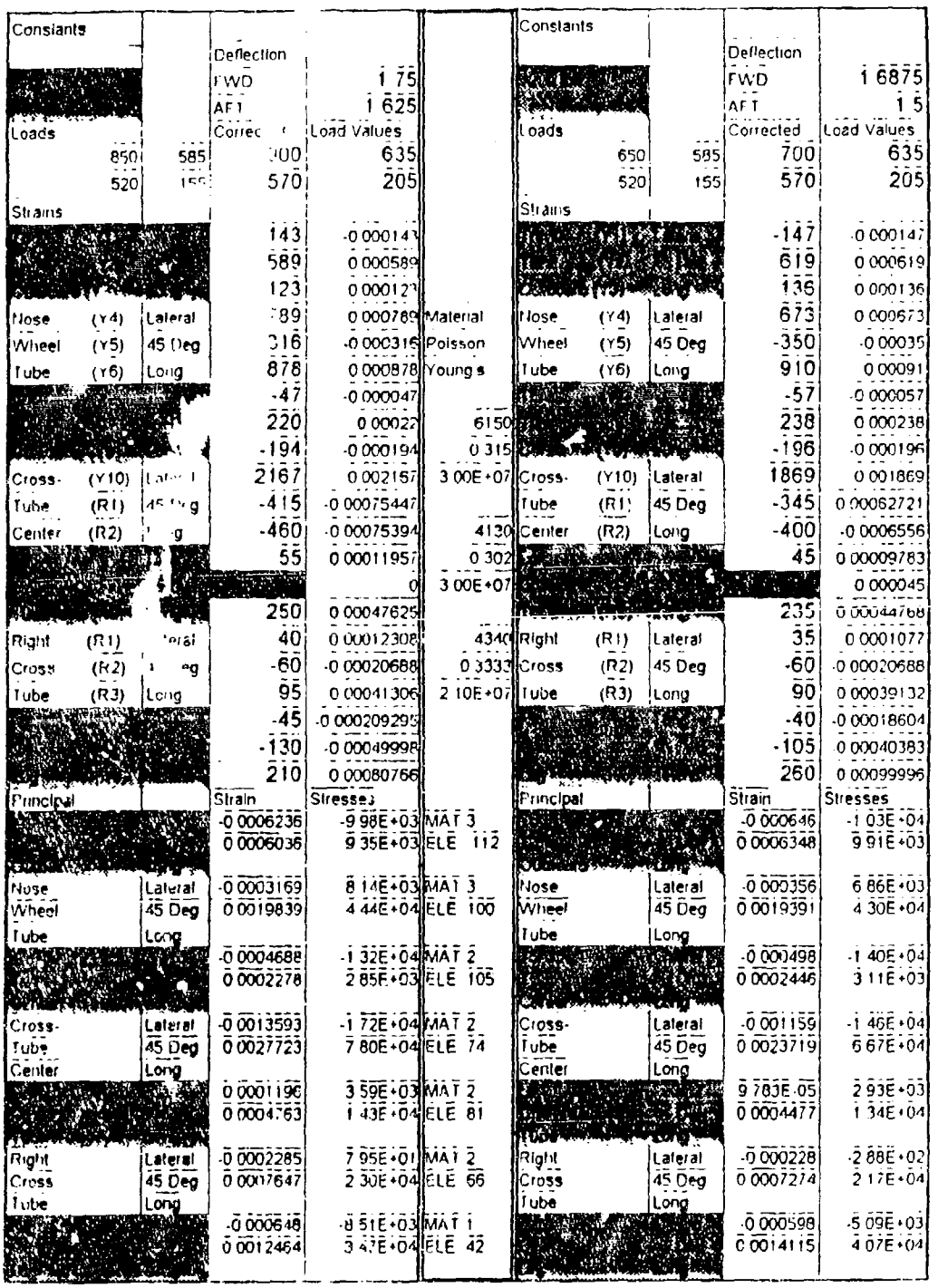
Constants			Deflection			Constants			Deflection	
[redacted]			FWD	1.875		[redacted]			FWD	1.8125
			AFT	2.375					AFT	2.25
Loads			Corrected	Load Values		Loads			Corrected	Load Values
	1650	585	1700	635			1450	585	1500	635
	520	155	570	205			520	155	570	205
Strains						Strains				
[redacted]			-173	-0.000173		[redacted]			-138	-0.000138
			512	0.000512					528	0.000528
			90	0.00009					88	0.000088
Nose	(Y4)	Lateral	939	0.000939	Material	Nose	(Y4)	Lateral	898	0.000898
Wheel	(Y5)	45 Deg	-266	-0.000266	Poisson	Wheel	(Y5)	45 Deg	-250	-0.00025
Tube	(Y6)	Long	804	0.000804	Young's	Tube	(Y6)	Long	815	0.000815
[redacted]			-43	-0.000043		[redacted]			-47	-0.000047
			191	0.000191	6150				188	0.000188
			-183	-0.000183	0.315				-184	-0.000184
Cross-	(Y10)	Lateral	2924	0.002924	3.00E+07	Cross-	(Y10)	Lateral	2670	0.00267
Tube	(R1)	45 Deg	-605	-0.00109989		Tube	(R1)	45 Deg	-590	0.00107262
Center	(R2)	Long	-605	-0.000991595	4130	Center	(R2)	Long	-595	0.00097521
[redacted]			80	0.00017392	0.302	[redacted]			80	0.00017392
[redacted]			[redacted]	0	3.00E+07	[redacted]			[redacted]	0
[redacted]			290	0.0005524		[redacted]			285	0.00054293
Right	(R1)	Lateral	50	0.00015385	4340	Right	(R1)	Lateral	50	0.00015385
Cross	(R2)	45 Deg	-60	-0.00020688	0.3333	Cross	(R2)	45 Deg	60	0.00020688
Tube	(R3)	Long	100	0.0004348	2.10E+07	Tube	(R3)	Long	100	0.0004348
[redacted]			-80	-0.00037208		[redacted]			-70	-0.00032557
			-190	-0.00073074					-175	-0.00067305
			480	0.00184608					440	0.00169224
Principal			Strain	Stresses		Principal			Strain	Stresses
[redacted]			-0.0006104	-1.03E+04	MAT 3	[redacted]			-0.000589	-9.68E+03
			0.0005274	7.65E+03	ELE 112				0.0005394	8.10E+03
Nose		Lateral	-0.000268	9.50E+03	MAT 3	Nose		Lateral	-0.000251	9.54E+03
Wheel		45 Deg	0.002011	4.54E+04	ELE 100	Wheel		45 Deg	0.0019638	4.44E+04
Tube		Long				Tube		Long		
[redacted]			-0.000425	-1.20E+04	MAT 2	[redacted]			-0.000427	-1.21E+04
			0.000199	2.33E+03	ELE 105				0.0001956	2.20E+03
Cross-		Lateral	-0.0018801	-2.41E+04	MAT 2	Cross-		Lateral	-0.001841	-2.35E+04
Tube		45 Deg	0.0038126	1.07E+05	ELE 74	Tube		45 Deg	0.0037361	1.05E+05
Center		Long				Center		Long		
[redacted]			0.0001739	5.22E+03	MAT 2	[redacted]			0.0001739	5.22E+03
			0.0005525	1.66E+04	ELE 81				0.0005429	1.63E+04
Right		Lateral	-0.0002262	6.57E+02	MAT 2	Right		Lateral	-0.000226	6.57E+02
Cross		45 Deg	0.0008148	2.46E+04	ELE 66	Cross		45 Deg	0.0008148	2.46E+04
Tube		Long				Tube		Long		
[redacted]			-0.0011027	-9.69E+03	MAT 1	[redacted]			-0.001007	-8.64E+03
			0.0025767	7.42E+04	ELE 42				0.0023738	6.85E+04

3200 lbs Aft Right, Center of Gravity



Constants						Constants					
			Deflection						Deflection		
[redacted]			FWD	2.8125		[redacted]			FWD	1.75	
			AFT	2.0625					AFT	1.9375	
Loads			Corrected	Load Values		Loads			Corrected	Load Values	
	1250	585	1300	635			1050	585	1100	635	
	520	155	570	205			520	155	570	205	
Strains						Strains					
[redacted]			-15	0.000152		[redacted]			-144	-0.000144	
			511	0.000541					566	0.000566	
			9	0.000096					111	0.000111	
Nose	(Y4)	Lateral	957	0.000957	Material	Nose	(Y4)	Lateral	838	0.000838	
Wheel	(Y5)	45 Deg	-29	-0.000279	Poisson	Wheel	(Y5)	45 Deg	-294	-0.000294	
Tube	(Y6)	Long	810	0.00084	Young s	Tube	(Y6)	Long	859	0.000859	
[redacted]			-45	-0.000045		[redacted]			-45	-0.000045	
			200	0.0002	6150				209	0.000209	
			-189	-0.000189	0.315				-191	-0.000191	
Cross-	(Y10)	Lateral	2710	0.00271	3.00E+07	Cross-	(Y10)	Lateral	2439	0.002439	
Tube	(R1)	45 Deg	-545	-0.00099081		Tube	(R1)	45 Deg	-485	-0.00088173	
Center	(R2)	Long	-560	-0.00091784	.4130	Center	(R2)	Long	-515	-0.00084409	
[redacted]			75	0.00016305	0.302	[redacted]			65	0.00014131	
				0	3.00E+07					0.000065	
			280	0.0005334					270	0.00051435	
Right	(R1)	Lateral	50	0.00015396	.4340	Right	(R1)	Lateral	40	0.00012308	
Cross	(R2)	45 Deg	-60	-0.00020688	0.333	Cross	(R2)	45 Deg	-60	-0.00020688	
Tube	(R3)	Long	100	0.0004348	2.10E+07	Tube	(R3)	Long	95	0.00041306	
[redacted]			-65	-0.000302315		[redacted]			-30	-0.00027906	
			-170	-0.00065382					-150	-0.0005769	
			420	0.00161532					370	0.00142302	
Principal			Strain	Stresses		Principal			Strain	Stresses	
[redacted]			-0.0000164	-1.01E+04	MAT 3	[redacted]			-0.000613	-9.91E+03	
			0.0005544	8.28E+03	ELE 112				0.0005798	8.87E+03	
Nose		Lateral	-0.0002805	9.73E+03	MAT 3	Nose		Lateral	-0.000294	8.73E+03	
Wheel		45 Deg	0.0020775	4.69E+04	ELE 100	Wheel		45 Deg	0.001991	4.47E+04	
Tube		Long				Tube		Long			
[redacted]			-0.0004421	-1.25E+04	MAT 2	[redacted]			-0.000453	-1.28E+04	
			0.0002061	2.46E+03	ELE 105				0.000217	2.65E+03	
Cross-		Lateral	-0.0017213	-2.18E+04	MAT 2	Cross-		Lateral	-0.001551	-1.96E+04	
Tube		45 Deg	0.0035135	9.88E+04	ELE 74	Tube		45 Deg	0.0031457	8.84E+04	
Center		Long				Center		Long			
[redacted]			0.0001631	4.89E+03	MAT 2	[redacted]			0.0001413	4.24E+03	
			0.0005334	1.60E+04	ELE 81				0.0005144	1.54E+04	
Right		Lateral	-0.0002262	6.57E+02	MAT 2	Right		Lateral	-0.000229	7.95E+01	
Cross		45 Deg	0.0008148	2.4FE+04	ELE 66	Cross		45 Deg	0.0007647	2.30E+04	
Tube		Long				Tube		Long			
[redacted]			-0.0002672	-8.29E+03	MAT 1	[redacted]			-0.000858	-7.57E+03	
			0.0022802	6.58E+04	ELE 42				0.0020017	5.77E+04	

3200 lbs Aft Right, Center of Gravity

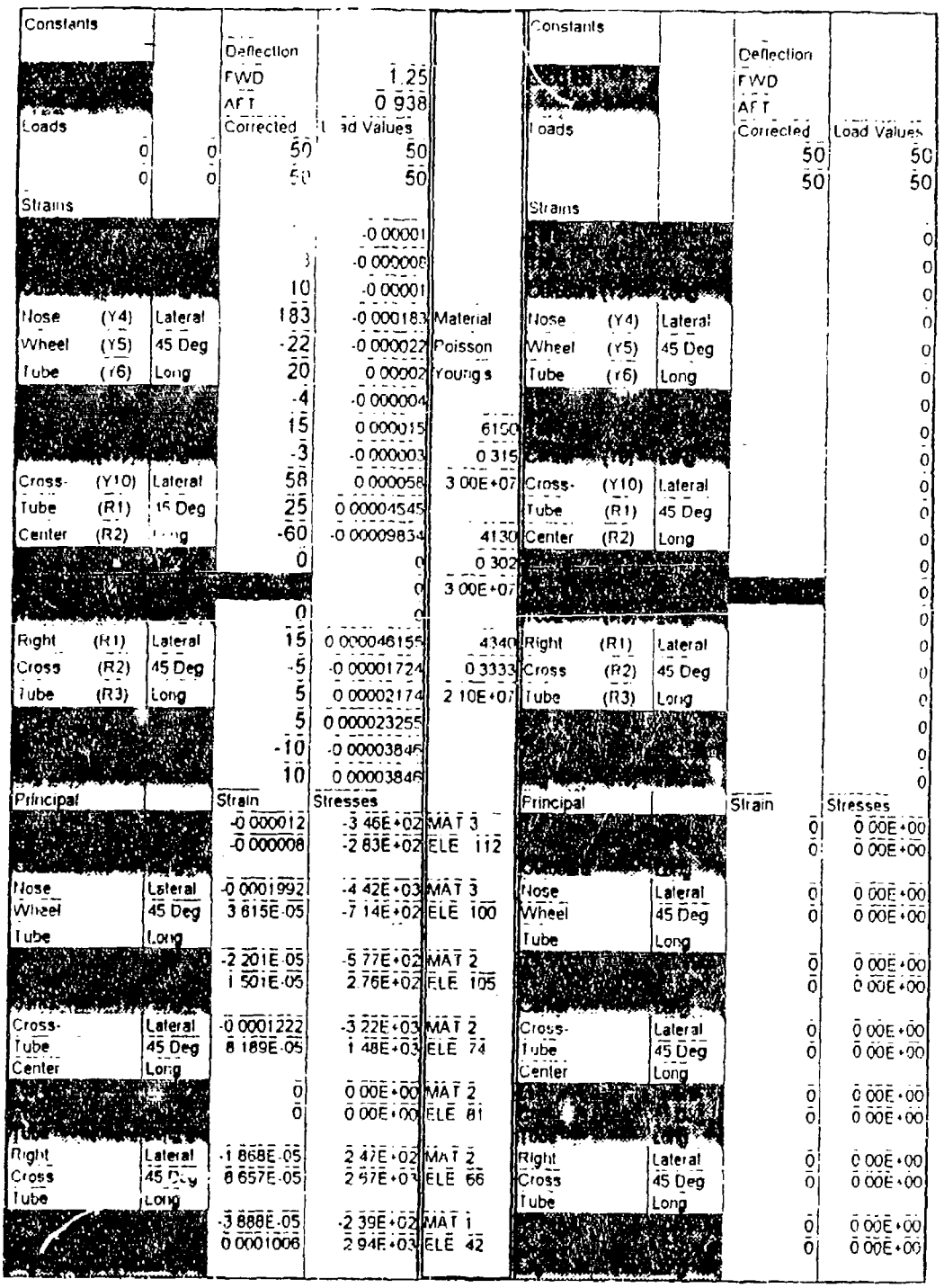


Constants					Constants			
		Deflection					Deflection	
[illegible]		FWD	1 75		[illegible]		FWD	1 6875
		AFT	1 625				AFT	1 5
Loads		Correc t	Load Values		Loads		Corrected	Load Values
850	585	700	635		650	585	700	635
520	155	570	205		520	155	570	205
Strains					Strains			
[illegible]		143	-0 000014		[illegible]		-147	-0 000147
		589	0 000589				619	0 000619
		123	0 000123				136	0 000136
Nose (Y4)	Lateral	789	0 000789	Material	Nose (Y4)	Lateral	673	0 000673
Wheel (Y5)	45 Deg	316	-0 000316	Poisson	Wheel (Y5)	45 Deg	-350	-0 00035
Tube (Y6)	Long	878	0 000878	Young s	Tube (Y6)	Long	910	0 00091
[illegible]		-47	-0 000047		[illegible]		-57	-0 000057
		220	0 00022	6150			238	0 000238
		-194	-0 000194	0 315			-196	-0 000196
Cross- (Y10)	Lateral	2167	0 002167	3 00E+07	Cross- (Y10)	Lateral	1869	0 001869
Tube (R1)	45 Deg	-415	-0 00075447		Tube (R1)	45 Deg	-345	0 00062721
Center (R2)	Long	-460	-0 00075394	4130	Center (R2)	Long	-400	-0 0006556
[illegible]		55	0 00011957	0 302	[illegible]		45	0 00009783
		[illegible]	0	3 00E+07			[illegible]	0 000045
		250	0 00047625				235	0 00044768
Right (R1)	Lateral	40	0 00012308	4340	Right (R1)	Lateral	35	0 0001077
Cross (R2)	45 Deg	-60	-0 00020688	0 3333	Cross (R2)	45 Deg	-60	-0 00020688
Tube (R3)	Long	95	0 00041306	2 10E+07	Tube (R3)	Long	90	0 00039132
[illegible]		-45	-0 00020929		[illegible]		-40	-0 00018604
		-130	-0 00049998				-105	-0 00040383
		210	0 00080766				260	0 00099996
Principal		Strain	Stresses		Principal		Strain	Stresses
[illegible]		-0 0006236	-9 98E+03	MAT 3	[illegible]		-0 000646	-1 03E+04
		0 0006036	9 35E+03	ELE 112			0 0006348	9 91E+03
Nose	Lateral	-0 0003169	8 14E+03	MAT 3	Nose	Lateral	-0 000356	6 86E+03
Wheel	45 Deg	0 0019839	4 44E+04	ELE 100	Wheel	45 Deg	0 0019391	4 30E+04
Tube	Long				Tube	Long		
[illegible]		-0 0004688	-1 32E+04	MAT 2	[illegible]		-0 000498	-1 40E+04
		0 0002278	2 85E+03	ELE 105			0 0002446	3 11E+03
Cross-	Lateral	-0 0013593	-1 72E+04	MAT 2	Cross-	Lateral	-0 001159	-1 46E+04
Tube	45 Deg	0 0027723	7 80E+04	ELE 74	Tube	45 Deg	0 0023719	6 67E+04
Center	Long				Center	Long		
[illegible]		0 0001196	3 59E+03	MAT 2	[illegible]		9 783E-05	2 93E+03
		0 0004763	1 43E+04	ELE 81			0 0004477	1 34E+04
Right	Lateral	-0 0002285	7 95E+01	MAT 2	Right	Lateral	-0 000228	-2 88E+02
Cross	45 Deg	0 0007647	2 30E+04	ELE 66	Cross	45 Deg	0 0007274	2 17E+04
Tube	Long				Tube	Long		
[illegible]		-0 000648	-8 51E+03	MAT 1	[illegible]		-0 000598	-5 09E+03
		0 0012464	3 43E+04	ELE 42			0 0014115	4 07E+04

3200 lbs Aft Right, Center of Gravity

Constants						Constants					
			Deflection						Deflection		
[redacted]			FWD	1.5		[redacted]			FWD	1 0625	
			AFT	1 0625					AFT	0 75	
Loads			Corrected	Load Values		Loads			Corrected	Load Values	
	450	450	500	500			250	250	300	300	
	450	155	500	205			250	155	300	205	
Strains						Strains					
[redacted]			-143	-0 000143		[redacted]			-65	-0 000065	
			559	0 000559					400	0 0004	
			124	0 000124					108	0 000108	
Nose	(Y4)	Lateral	665	0 000665	Material	Nose	(Y4)	Lateral	260	0 00026	
Wheel	(Y5)	45 Deg	-315	-0 000315	Poisson	Wheel	(Y5)	45 Deg	-213	-0 000213	
Tube	(Y6)	Long	870	0 00087	Young s	Tube	(Y6)	Long	648	0 000648	
[redacted]			-59	-0 000059		[redacted]			-50	-0 00005	
			223	0 000223	6150				172	0 000172	
			-182	-0 000182	0 315				-132	-0 000132	
Cross-	(Y10)	Lateral	1419	0 001419	3 00E+07	Cross-	(Y10)	Lateral	903	0 000903	
Tube	(R1)	45 Deg	-260	-0 00047268		Tube	(R1)	45 Deg	-150	-0 0002727	
Center	(R2)	Long	-310	-0 00050809	4130	Center	(R2)	Long	-205	-0 000335	
[redacted]			25	0 00005435	0 302	[redacted]			15	0 00003261	
				0	3 00E+07					0	
			195	0 000371475					120	0 0002286	
Right	(R1)	Lateral	20	0 00006154	4340	Right	(R1)	Lateral	15	4 6155E-05	
Cross	(R2)	45 Deg	-50	-0 0001724	0 3333	Cross	(R2)	45 Deg	-35	-0 00012068	
Tube	(R3)	Long	80	0 00034784	2 10E+07	Tube	(R3)	Long	60	0 00026088	
[redacted]			-25	-0 000116275		[redacted]			-10	-0 00004651	
			-80	-0 00030768					-50	-0 0001923	
			195	0 00074997					120	0 00046152	
Principal			Strain	Stresses		Principal			Strain	Stresses	
[redacted]			-0 0005935	-9 50E+03	MAT 3	[redacted]			-0 000367	-5 44E+03	
			0 0005745	8 90E+03	ELE 112				0 0004098	6 79E+03	
Nose		Lateral	-0 0003198	7 05E+03	MAT 3	Nose		Lateral	-0 000241	3 36E+03	
Wheel		45 Deg	0 0018548	4 13E+04	ELE 100	Wheel		45 Deg	0 0011486	2 52E+04	
Tube		Long				Tube		Long			
[redacted]			-0 0004695	-1 32E+04	MAT 2	[redacted]			-0 000357	-1 00E+04	
			0 0002285	2 86E+03	ELE 105				0 0001752	2 22E+03	
Cross-		Lateral	-0 0008824	-1 13E+04	MAT 2	Cross-		Lateral	-0 000549	-7 00E+03	
Tube		45 Deg	0 0017933	5 04E+04	ELE 74	Tube		45 Deg	0 0011161	3 14E+04	
Center		Long				Center		Long			
[redacted]			5 435E-05	1 63E+03	MAT 2	[redacted]			3 261E-05	9 78E+02	
			0 0003715	1 11E+04	ELE 81				0 0002286	6 86E+03	
Right		Lateral	-0 0001987	-4 95E+02	MAT 2	Right		Lateral	-0 000141	-1 87E+02	
Cross		45 Deg	0 000608	1 81E+04	ELE 66	Cross		45 Deg	0 000448	1 34E+04	
Tube		Long				Tube		Long			
[redacted]			-0 0004432	-3 46E+03	MAT 1	[redacted]			-0 000266	-1 72E+03	
			0 0010769	3 12E+04	ELE 42				0 0006812	1 99E+04	

3200 lbs Aft Right, Center of Gravity

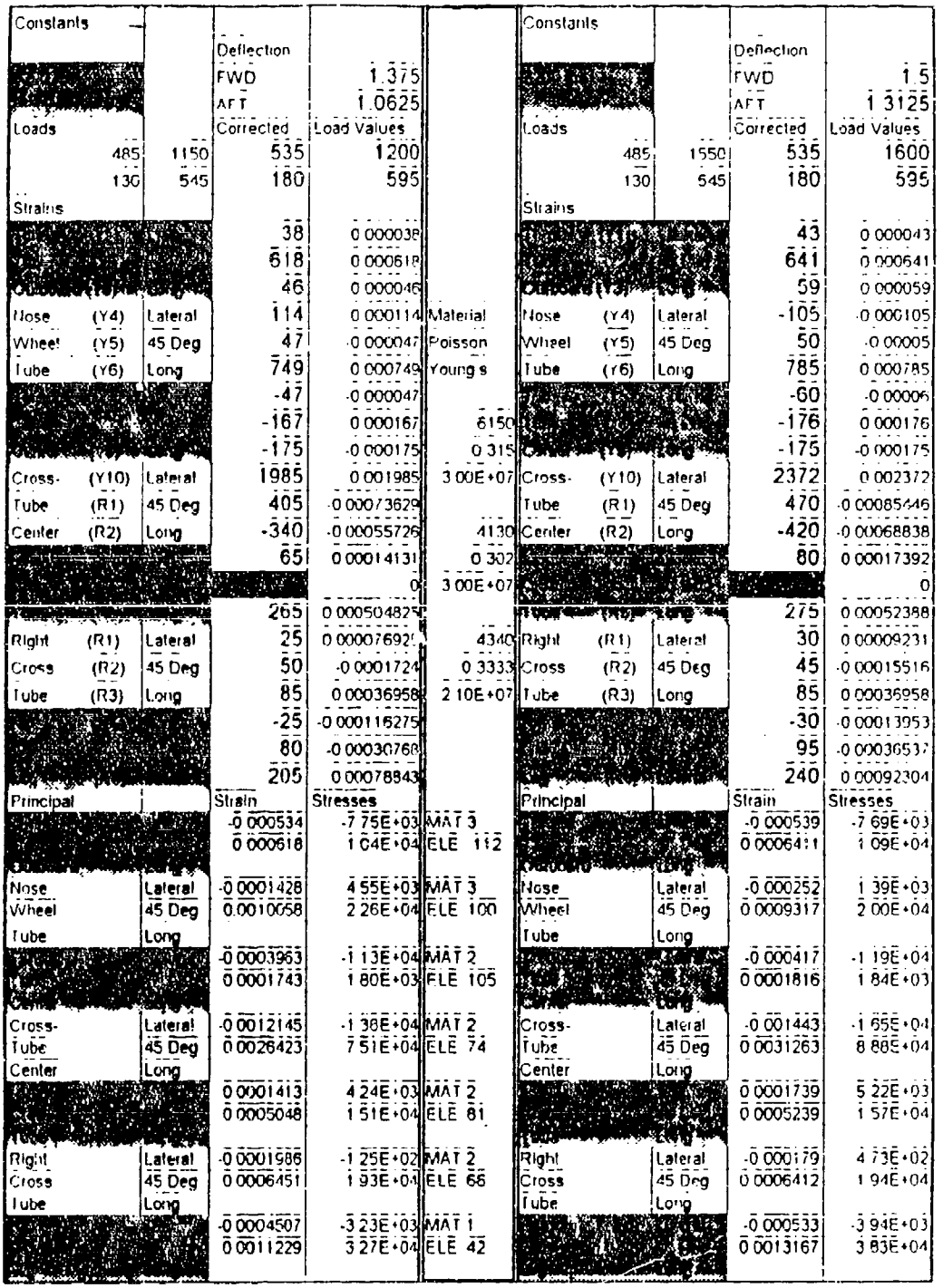


Constants		Deflection			Constants		Deflection	
		FWD	1.25				FWD	
		AFT	0.938				AFT	
Loads		Corrected	Load Values		Loads		Corrected	Load Values
0	0	50	50				50	50
0	0	50	50				50	50
Strains					Strains			
			-0.00001					0
			-0.000008					0
		10	-0.00001					0
Nose (Y4)	Lateral	183	-0.000183	Material	Nose (Y4)	Lateral		0
Wheel (Y5)	45 Deg	-22	-0.000022	Poisson	Wheel (Y5)	45 Deg		0
Tube (r6)	Long	20	0.00002	Youngs	Tube (r6)	Long		0
		-4	-0.000004					0
		15	0.000015	6150				0
		-3	-0.000003	0.315				0
Cross- (Y10)	Lateral	58	0.000058	3.00E+07	Cross- (Y10)	Lateral		0
Tube (R1)	45 Deg	25	0.00004545		Tube (R1)	45 Deg		0
Center (R2)	Long	-60	-0.00009834	4130	Center (R2)	Long		0
		0	0	0.302				0
			0	3.00E+07				0
		0	0					0
Right (R1)	Lateral	15	0.000046155	4340	Right (R1)	Lateral		0
Cross (R2)	45 Deg	-5	-0.00001724	0.3333	Cross (R2)	45 Deg		0
Tube (R3)	Long	5	0.00002174	2.10E+07	Tube (R3)	Long		0
		5	0.000023255					0
		-10	-0.0000384					0
		10	0.0000384					0
Principal		Strain	Stresses		Principal		Strain	Stresses
		-0.000012	-3.46E+02	MAT 3			0	0.00E+00
		-0.000008	-2.83E+02	ELE 112			0	0.00E+00
Nose	Lateral	-0.0001992	-4.42E+03	MAT 3	Nose	Lateral	0	0.00E+00
Wheel	45 Deg	3.815E-05	-7.14E+02	ELE 100	Wheel	45 Deg	0	0.00E+00
Tube	Long				Tube	Long		
		-2.201E-05	-5.77E+02	MAT 2			0	0.00E+00
		1.501E-05	2.76E+02	ELE 105			0	0.00E+00
Cross-	Lateral	-0.0001222	-3.22E+03	MAT 2	Cross-	Lateral	0	0.00E+00
Tube	45 Deg	8.189E-05	1.48E+03	ELE 74	Tube	45 Deg	0	0.00E+00
Center	Long				Center	Long		
		0	0.00E+00	MAT 2			0	0.00E+00
		0	0.00E+00	ELE 81			0	0.00E+00
Right	Lateral	-1.868E-05	2.47E+02	MAT 2	Right	Lateral	0	0.00E+00
Cross	45 Deg	8.657E-05	2.57E+03	ELE 66	Cross	45 Deg	0	0.00E+00
Tube	Long				Tube	Long		
		-3.888E-05	-2.39E+02	MAT 1			0	0.00E+00
		0.0001006	2.94E+03	ELE 42			0	0.00E+00

3200 lbs Aft Right, Center of Gravity

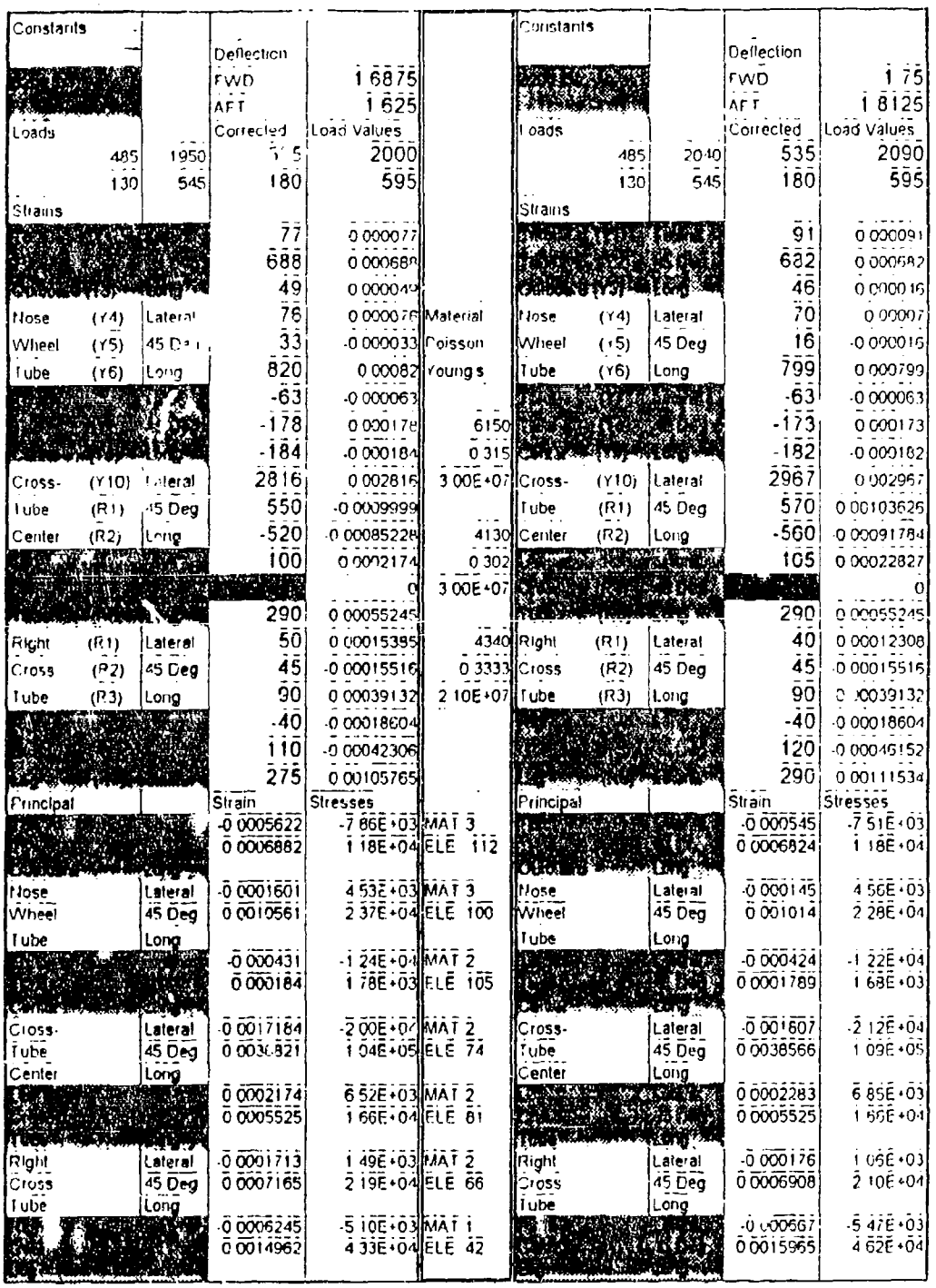
Constants			Deflection			Constants			Deflection	
[redacted]			FWD	0 9375		[redacted]			FWD	1.3125
			AFT	0 25					AFT	0 75
Loads			Corrected	Load Values		Loads			Corrected	Load Values
	350	350	100	400			465	750	535	800
	130	350	180	400			130	545	180	595
Strains						Strains				
[redacted]			-23	-0 000023		[redacted]			20	0 00002
			412	0 000412					652	0 000652
			68	0 000068					72	0 000072
Nose	(Y4)	Lateral	166	0 000166	Material	Nose	(Y4)	Lateral	45	0 000045
Wheel	(Y5)	45 Deg	124	-0 000124	Poisson	Wheel	(Y5)	45 Deg	79	-0 000079
Tube	(Y6)	Long	611	0 000611	Young s	Tube	(Y6)	Long	797	0 000797
[redacted]			-44	-0 000044		[redacted]			-58	-0 000058
			-152	0 000152	6150				-186	0 000186
			-131	-0 000131	0 315				-179	-0 000179
Cross-	(Y10)	Lateral	860	0 00086	3 00E+07	Cross-	(Y10)	Lateral	1536	0 001536
Tube	(R1)	45 Deg	210	-0 00038178		Tube	(R1)	45 Deg	320	-0 00058176
Center	(R2)	Long	-210	-0 00034419	4130	Center	(R2)	Long	-250	-0 00040975
[redacted]			30	0 00006522	0 302	[redacted]			50	0 0001087
			0	0	3 00E+07				0	0
[redacted]			170	0 00032365		[redacted]			235	0 00044708
Right	(R1)	Lateral	5	0 000015385	4340	Right	(R1)	Lateral	15	4 6155E-05
Cross	(R2)	45 Deg	35	-0 00012068	0 3333	Cross	(R2)	45 Deg	45	-0 00015516
Tube	(R3)	Long	60	0 00026088	2 10E+07	Tube	(R3)	Long	80	0 00034784
[redacted]			-15	-0 000069765		[redacted]			-20	-0 00009302
			40	-0 00015384					70	-0 00026922
			105	0 00040383					170	0 00065382
Principal			Strain	Stresses		Principal			Strain	Stresses
[redacted]			-0 0003696	-5 47E+03	MAT 3	[redacted]			-0 000561	-8 10E+03
			0 0004146	6 89E+03	ELE 112				0 0006526	1 10E+04
Nose		Lateral	-0 0001702	3 44E+03	MAT 3	Nose		Lateral	-0 000205	3 41E+03
Wheel		45 Deg	0 0009472	2 10E+04	ELE 100	Wheel		45 Deg	0 0010466	2 31E+04
Tube		Long				Tube		Long		
[redacted]			-0 0003309	-9 37E+03	MAT 2	[redacted]			-0 000429	-1 22E+04
			0 0001559	1 85E+03	ELE 105				0 000192	2 06E+03
Cross-		Lateral	-0 0006206	-9 16E+03	MAT 2	Cross-		Lateral	-0 000939	-1 04E+04
Tube		45 Deg	0 0011364	3 13E+04	ELE 74	Tube		45 Deg	0 0020655	5 88E+04
Center		Long				Center		Long		
[redacted]			6 522E-05	1 96E+03	MAT 2	[redacted]			0 0001087	3 26E+03
			0 0003239	9 72E+03	ELE 81				0 0004477	1 34E+04
Right		Lateral	-0 0001483	-6 63E+02	MAT 2	Right		Lateral	-0 000186	-3 60E+02
Cross		45 Deg	0 0004246	1 25E+04	ELE 66	Cross		45 Deg	0 0005801	1 73E+04
Tube		Long				Tube		Long		
[redacted]			-0 0002318	-1 78E+03	MAT 1	[redacted]			-0 000384	-2 88E+03
			0 0005658	1 64E+04	ELE 42				0 0009449	2 74E+04

3200 lbs Aft Left, Center of Gravity



Constants			Deflection			Constants			Deflection	
			FWD	1.375					FWD	1.5
			AFT	1.0625					AFT	1.3125
Loads			Corrected	Load Values		Loads			Corrected	Load Values
	485	1150	535	1200			485	1550	535	1600
	130	545	180	595			130	545	180	595
Strains						Strains				
			38	0.000038					43	0.000043
			618	0.000618					641	0.000641
			46	0.000046					59	0.000059
Nose	(Y4)	Lateral	114	0.000114	Material	Nose	(Y4)	Lateral	-105	-0.000105
Wheel	(Y5)	45 Deg	47	-0.000047	Poisson	Wheel	(Y5)	45 Deg	50	-0.00005
Tube	(Y6)	Long	749	0.000749	Young s	Tube	(Y6)	Long	785	0.000785
			-47	-0.000047					-60	-0.00006
			-167	0.000167	6150				-176	0.000176
			-175	-0.000175	0.315				-175	-0.000175
Cross-	(Y10)	Lateral	1985	0.001985	3.00E+07	Cross-	(Y10)	Lateral	2372	0.002372
Tube	(R1)	45 Deg	405	-0.00073629		Tube	(R1)	45 Deg	470	-0.00085446
Center	(R2)	Long	-340	-0.00055726	4130	Center	(R2)	Long	-420	-0.00068838
			65	0.00014131	0.302				80	0.00017392
				0	3.00E+07					0
			265	0.000504825					275	0.00052388
Right	(R1)	Lateral	25	0.00007692	4340	Right	(R1)	Lateral	30	0.00009231
Cross	(R2)	45 Deg	50	-0.0001724	0.3333	Cross	(R2)	45 Deg	45	-0.00015516
Tube	(R3)	Long	85	0.00036958	2.10E+07	Tube	(R3)	Long	85	0.00036958
			-25	-0.000116275					-30	-0.00013953
			80	-0.00030768					95	-0.00036537
			205	0.00078843					240	0.00092304
Principal			Strain	Stresses		Principal			Strain	Stresses
			-0.000534	-7.75E+03	MAT 3				-0.000539	-7.69E+03
			0.000618	1.04E+04	ELE 112				0.000611	1.09E+04
Nose		Lateral	-0.0001428	4.55E+03	MAT 3	Nose		Lateral	-0.000252	1.39E+03
Wheel		45 Deg	0.0010658	2.26E+04	ELE 100	Wheel		45 Deg	0.0009317	2.00E+04
Tube		Long				Tube		Long		
			-0.0003963	-1.13E+04	MAT 2				-0.000417	-1.19E+04
			0.0001743	1.80E+03	ELE 105				0.0001816	1.84E+03
Cross-		Lateral	-0.0012145	-1.38E+04	MAT 2	Cross-		Lateral	-0.001443	-1.65E+04
Tube		45 Deg	0.0026423	7.51E+04	ELE 74	Tube		45 Deg	0.0031263	8.88E+04
Center		Long				Center		Long		
			0.0001413	4.24E+03	MAT 2				0.0001739	5.22E+03
			0.0005048	1.51E+04	ELE 81				0.0005239	1.57E+04
Right		Lateral	-0.0001986	-1.25E+02	MAT 2	Right		Lateral	-0.000179	4.73E+02
Cross		45 Deg	0.0006451	1.93E+04	ELE 66	Cross		45 Deg	0.0006412	1.94E+04
Tube		Long				Tube		Long		
			-0.0004507	-3.23E+03	MAT 1				-0.000533	-3.94E+03
			0.0011229	3.27E+04	ELE 42				0.0013167	3.83E+04

3200 lbs Aft Left, Center of Gravity

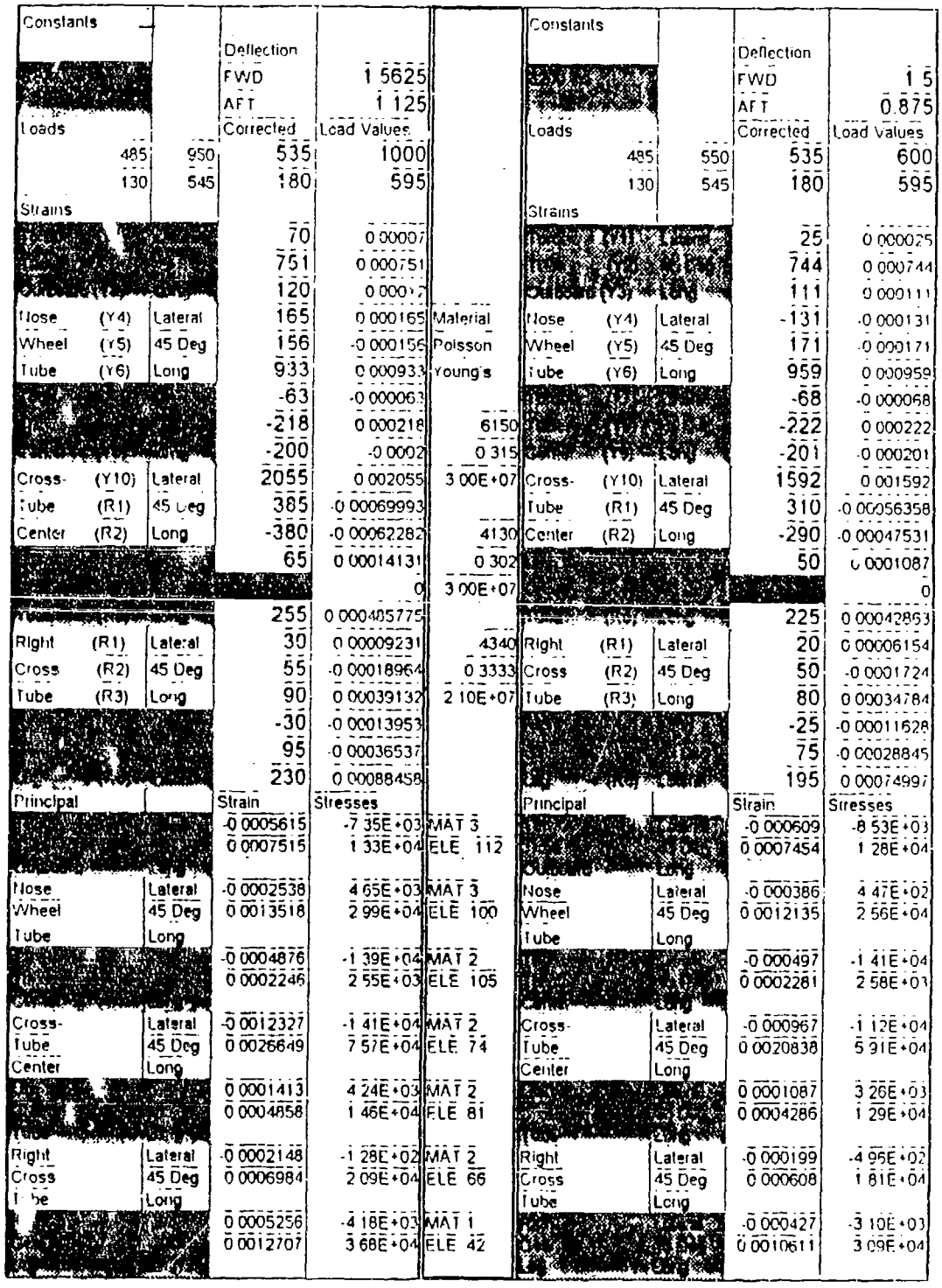


Constants			Deflection			Constants			Deflection	
[redacted]			FWD	1 6875		[redacted]			FWD	1 75
[redacted]			AFT	1 625		[redacted]			AFT	1 8125
Loads			Corrected	Load Values		Loads			Corrected	Load Values
	485	1950	515	2000			485	2040	535	2090
	130	545	180	595			130	545	180	595
Strains						Strains				
[redacted]			77	0 000077		[redacted]			91	0 000091
[redacted]			688	0 000688		[redacted]			682	0 000682
[redacted]			49	0 000049		[redacted]			46	0 000046
Nose	(Y4)	Lateral	76	0 000076	Material	Nose	(Y4)	Lateral	70	0 00007
Wheel	(Y5)	45 Deg	33	-0 000033	Poisson	Wheel	(Y5)	45 Deg	16	-0 000016
Tube	(Y6)	Long	820	0 00082	Youngs	Tube	(Y6)	Long	799	0 000799
[redacted]			-63	-0 000063		[redacted]			-63	-0 000063
[redacted]			-178	0 000178	6150	[redacted]			-173	0 000173
[redacted]			-184	-0 000184	0 315	[redacted]			-182	-0 000182
Cross-	(Y10)	Lateral	2816	0 002816	3 00E+07	Cross-	(Y10)	Lateral	2967	0 002967
Tube	(R1)	45 Deg	550	-0 0009999		Tube	(R1)	45 Deg	570	0 00103626
Center	(R2)	Long	-520	-0 00085228	4130	Center	(R2)	Long	-560	-0 00091784
[redacted]			100	0 0002174	0 302	[redacted]			105	0 00022827
[redacted]				0	3 00E+07	[redacted]				0
[redacted]			290	0 00055245		[redacted]			290	0 00055245
Right	(R1)	Lateral	50	0 00015395	4340	Right	(R1)	Lateral	40	0 00012308
Cross	(R2)	45 Deg	45	-0 00015516	0 3333	Cross	(R2)	45 Deg	45	-0 00015516
Tube	(R3)	Long	90	0 00039132	2 10E+07	Tube	(R3)	Long	90	0 00039132
[redacted]			-40	-0 00018604		[redacted]			-40	-0 00018604
[redacted]			110	-0 00042306		[redacted]			120	-0 00046152
[redacted]			275	0 00105765		[redacted]			290	0 00111534
Principal			Strain	Stresses		Principal			Strain	Stresses
[redacted]			-0 0005622	-7 66E+03	MAT 3	[redacted]			-0 0005545	-7 51E+03
[redacted]			0 0006882	1 18E+04	ELE 112	[redacted]			0 0006824	1 18E+04
Nose		Lateral	-0 0001601	4 53E+03	MAT 3	Nose		Lateral	-0 000145	4 56E+03
Wheel		45 Deg	0 0010561	2 37E+04	ELE 100	Wheel		45 Deg	0 001014	2 28E+04
Tube		Long				Tube		Long		
[redacted]			-0 000431	-1 24E+04	MAT 2	[redacted]			-0 000424	-1 22E+04
[redacted]			0 000184	1 78E+03	ELE 105	[redacted]			0 0001789	1 68E+03
Cross-		Lateral	-0 0017184	-2 00E+04	MAT 2	Cross-		Lateral	-0 001607	-2 12E+04
Tube		45 Deg	0 0030821	1 04E+05	ELE 74	Tube		45 Deg	0 0038566	1 09E+05
Center		Long				Center		Long		
[redacted]			0 0002174	6 52E+03	MAT 2	[redacted]			0 0002283	6 85E+03
[redacted]			0 0005525	1 66E+04	ELE 81	[redacted]			0 0005525	1 66E+04
Right		Lateral	-0 0001713	1 49E+03	MAT 2	Right		Lateral	-0 000176	1 06E+03
Cross		45 Deg	0 0007165	2 19E+04	ELE 66	Cross		45 Deg	0 0006908	2 10E+04
Tube		Long				Tube		Long		
[redacted]			-0 0006245	-5 10E+03	MAT 1	[redacted]			-0 000667	-5 47E+03
[redacted]			0 0014962	4 33E+04	ELE 42	[redacted]			0 0015965	4 62E+04

3200 lbs Aft Left, Center of Gravity

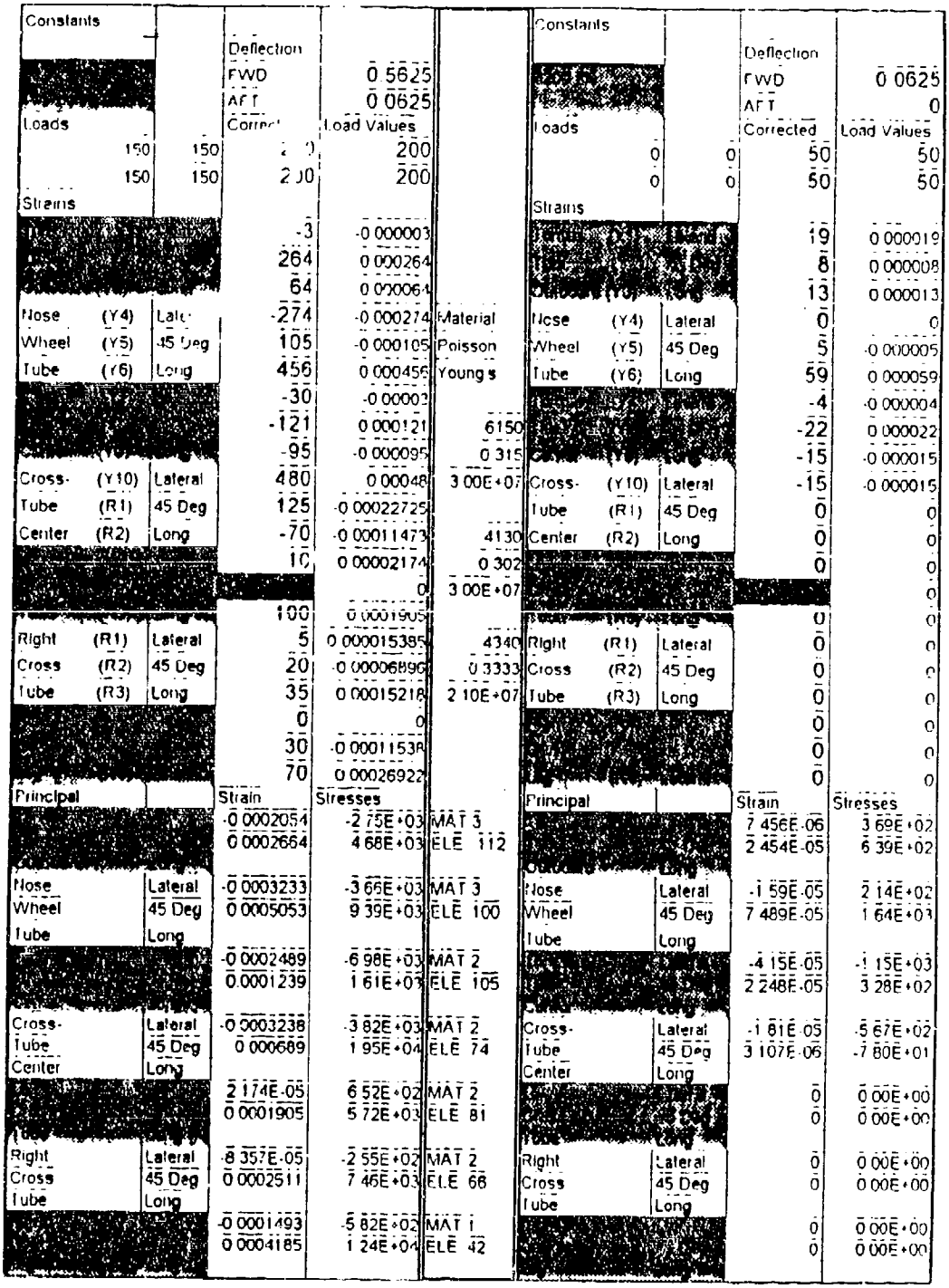
Constants						Constants				
			Deflection						Deflection	
[redacted]			FWD	1.625		[redacted]			FWD	1.625
			AFT	1.75					AFT	1.5625
Loads			Corrected	Load Values		Loads			Corrected	Load Values
	485	1750	535	1800			485	1350	535	1400
	130	545	180	595			130	545	180	595
Strains						Strains				
[redacted]			83	0.000083		[redacted]			92	0.000092
			665	0.000665					703	0.000703
			40	0.00004					79	0.000079
Nose	(Y4)	Lateral	42	0.000042	Material	Nose	(Y4)	Lateral	-107	-0.000107
Wheel	(Y5)	45 Deg	54	-0.000054	Poisson	Wheel	(Y5)	45 Deg	100	-0.0001
Tube	(Y6)	Long	819	0.000819	Young's	Tube	(Y6)	Long	869	0.000869
[redacted]			-60	-0.00006		[redacted]			-58	-0.000058
			-175	0.000175	6150				-189	0.000189
			-180	-0.00018	0.315				-188	-0.000188
Cross-	(Y10)	Lateral	2888	0.002888	3.00E+07	Cross-	(Y10)	Lateral	2573	0.002573
Tube	(R1)	45 Deg	580	-0.00105444		Tube	(R1)	45 Deg	490	-0.00089082
Center	(R2)	Long	-540	-0.00088506	4130	Center	(R2)	Long	-480	-0.00078672
[redacted]			100	0.0002174	0.302	[redacted]			85	0.00018473
			[redacted]	0	3.00E+07				[redacted]	0
			290	0.00055245					280	0.0005334
Right	(R1)	Lateral	40	0.00012306	4340	Right	(R1)	Lateral	35	0.0001077
Cross	(R2)	45 Deg	45	-0.00015516	0.3333	Cross	(R2)	45 Deg	50	-0.0001724
Tube	(R3)	Long	90	0.00039132	2.10E+07	Tube	(R3)	Long	90	0.00039132
[redacted]			-45	-0.000209295		[redacted]			-40	-0.00018604
			115	-0.00044229					115	-0.00044229
			295	0.00113457					275	0.00105765
Principal			Strain	Stresses		Principal			Strain	Stresses
[redacted]			-0.0005424	-7.57E+03	MAT 3	[redacted]			-0.000532	-7.03E+03
			0.0006654	1.14E+04	ELE 112				0.000703	1.24E+04
Nose		Lateral	-0.0001905	3.78E+03	MAT 3	Nose		Lateral	-0.000304	1.21E+03
Wheel		45 Deg	0.0010515	2.33E+04	ELE 100	Wheel		45 Deg	0.0010662	2.28E+04
Tube		Long				Tube		Long		
[redacted]			-0.000421	-1.21E+04	MAT 2	[redacted]			-0.000442	-1.26E+04
			0.000181	1.78E+03	ELE 105				0.0001957	2.06E+03
Cross-		Lateral	-0.0017888	-2.12E+04	MAT 2	Cross-		Lateral	-0.001557	-1.81E+04
Tube		45 Deg	0.0037918	1.07E+05	ELE 74	Tube		45 Deg	0.0033435	9.48E+04
Center		Long				Center		Long		
[redacted]			0.0002174	6.52E+03	MAT 2	[redacted]			0.0001848	5.54E+03
			0.0005525	1.66E+04	ELE 81				0.0005334	1.60E+04
Right		Lateral	-0.0001764	1.05E+03	MAT 2	Right		Lateral	-0.000195	4.68E+02
Cross		45 Deg	0.0006908	2.10E+04	ELE 66	Cross		45 Deg	0.0006946	2.10E+04
Tube		Long				Tube		Long		
[redacted]			-0.0006645	-5.45E+03	MAT 1	[redacted]			-0.00064	-5.46E+03
			0.0015898	4.60E+04	ELE 42				0.0015118	4.36E+04

3200 lbs Aft Left, Center of Gravity



Constants			Deflection			Constants			Deflection	
			FWD	1 5625					FWD	1 5
			AFT	1 125					AFT	0.875
Loads			Corrected	Load Values		Loads			Corrected	Load Values
	485	950	535	1000			485	550	535	600
	130	545	180	595			130	545	180	595
Strains						Strains				
			70	0 00007					25	0 000025
			751	0 000751					744	0 000744
			120	0 000					111	0 000111
Nose	(Y4)	Lateral	165	0 000165	Material	Nose	(Y4)	Lateral	-131	-0 000131
Wheel	(Y5)	45 Deg	156	-0 000156	Poisson	Wheel	(Y5)	45 Deg	171	0 000171
Tube	(Y6)	Long	933	0 000933	Young's	Tube	(Y6)	Long	959	0 000959
			-63	-0 000063					-68	-0 000068
			-218	0 000218	6150				-222	0 000222
			-200	-0 0002	0 315				-201	-0 000201
Cross-	(Y10)	Lateral	2055	0 002055	3 00E+07	Cross-	(Y10)	Lateral	1592	0 001592
Tube	(R1)	45 Deg	385	-0 00069993		Tube	(R1)	45 Deg	310	-0 00056358
Center	(R2)	Long	-380	-0 00062282	4130	Center	(R2)	Long	-290	-0 00047531
			65	0 00014131	0 302				50	0 0001087
				0	3 00E+07					0
			255	0 000405775					225	0 00042863
Right	(R1)	Lateral	30	0 00009231	4340	Right	(R1)	Lateral	20	0 00006154
Cross	(R2)	45 Deg	55	-0 00018964	0 3333	Cross	(R2)	45 Deg	50	-0 0001724
Tube	(R3)	Long	90	0 00039132	2 10E+07	Tube	(R3)	Long	80	0 00034784
			-30	-0 00013953					-25	-0 00011628
			95	-0 00036537					75	-0 00028845
			230	0 00088458					195	0 00074997
Principal			Strain	Stresses		Principal			Strain	Stresses
			-0 0005615	-7 35E+03	MAT 3				-0 000609	-8 53E+03
			0 0007515	1 33E+04	ELE 112				0 0007454	1 28E+04
Nose		Lateral	-0 0002538	4 65E+03	MAT 3	Nose		Lateral	-0 000386	4 47E+02
Wheel		45 Deg	0 0013518	2 99E+04	ELE 100	Wheel		45 Deg	0 0012135	2 56E+04
Tube		Long				Tube		Long		
			-0 0004876	-1 39E+04	MAT 2				-0 000497	-1 41E+04
			0 0002246	2 55E+03	ELE 105				0 0002281	2 58E+03
Cross-		Lateral	-0 0012327	-1 41E+04	MAT 2	Cross-		Lateral	-0 000967	-1 12E+04
Tube		45 Deg	0 0026649	7 57E+04	ELE 74	Tube		45 Deg	0 0020838	5 91E+04
Center		Long				Center		Long		
			0 0001413	4 24E+03	MAT 2				0 0001087	3 26E+03
			0 0004858	1 46E+04	ELE 81				0 0004286	1 29E+04
Right		Lateral	-0 0002148	-1 28E+02	MAT 2	Right		Lateral	-0 000199	-4 96E+02
Cross		45 Deg	0 0006984	2 09E+04	ELE 66	Cross		45 Deg	0 000608	1 81E+04
Tube		Long				Tube		Long		
			0 0005256	-4 18E+03	MAT 1				-0 000427	-3 10E+03
			0 0012707	3 68E+04	ELE 42				0 0010611	3 09E+04

3200 lbs Aft Left, Center of Gravity



Constants					Constants			
		Deflection					Deflection	
		FWD	0 5625				FWD	0 0625
		AFT	0 0625				AFT	0
Loads		Corrected	Load Values		Loads		Corrected	Load Values
150	150	200	200		0	0	50	50
150	150	200	200		0	0	50	50
Strains					Strains			
		-3	-0 000003				19	0 000019
		264	0 000264				8	0 000008
		64	0 000064				13	0 000013
Nose (Y4)	Lateral	-274	-0 000274	Material	Nose (Y4)	Lateral	0	0
Wheel (Y5)	45 Deg	105	-0 000105	Poisson	Wheel (Y5)	45 Deg	5	-0 000005
Tube (Y6)	Long	456	0 000456	Young s	Tube (Y6)	Long	59	0 000059
		-30	-0 00002				-4	-0 000004
		-121	0 000121	6150			-22	0 000022
		-95	-0 000095	0 315			-15	-0 000015
Cross- (Y10)	Lateral	480	0 00048	3 00E+07	Cross- (Y10)	Lateral	-15	-0 000015
Tube (R1)	45 Deg	125	-0 00022725		Tube (R1)	45 Deg	0	0
Center (R2)	Long	-70	-0 00011473	4130	Center (R2)	Long	0	0
		10	0 00002174	0 302			0	0
			0	3 00E+07				0
		100	0 0001905				0	0
Right (R1)	Lateral	5	0 000015385	4340	Right (R1)	Lateral	0	0
Cross (R2)	45 Deg	20	-0 00006896	0 3333	Cross (R2)	45 Deg	0	0
Tube (R3)	Long	35	0 00015218	2 10E+07	Tube (R3)	Long	0	0
		0	0				0	0
		30	-0 00011536				0	0
		70	0 00026922				0	0
Principal		Strain	Stresses		Principal		Strain	Stresses
		-0 0002054	-2 75E+03	MAT 3			7 456E-06	3 69E+02
		0 0002664	4 68E+03	ELE 112			2 454E-05	6 39E+02
Nose	Lateral	-0 0003233	-3 66E+03	MAT 3	Nose	Lateral	-1 59E-05	2 14E+02
Wheel	45 Deg	0 0005053	9 39E+03	ELE 100	Wheel	45 Deg	7 489E-05	1 64E+03
Tube	Long				Tube	Long		
		-0 0002489	-6 98E+03	MAT 2			-4 15E-05	-1 15E+03
		0 0001239	1 61E+03	ELE 105			2 248E-05	3 28E+02
Cross-	Lateral	-0 0003238	-3 82E+03	MAT 2	Cross-	Lateral	-1 81E-05	-5 67E+02
Tube	45 Deg	0 000689	1 95E+04	ELE 74	Tube	45 Deg	3 107E-06	-7 80E+01
Center	Long				Center	Long		
		2 174E-05	6 52E+02	MAT 2			0	0 00E+00
		0 0001905	5 72E+03	ELE 81			0	0 00E+00
Right	Lateral	-8 357E-05	-2 55E+02	MAT 2	Right	Lateral	0	0 00E+00
Cross	45 Deg	0 0002511	7 46E+03	ELE 68	Cross	45 Deg	0	0 00E+00
Tube	Long				Tube	Long		
		-0 0001493	-5 82E+02	MAT 1			0	0 00E+00
		0 0004185	1 24E+04	ELE 42			0	0 00E+00

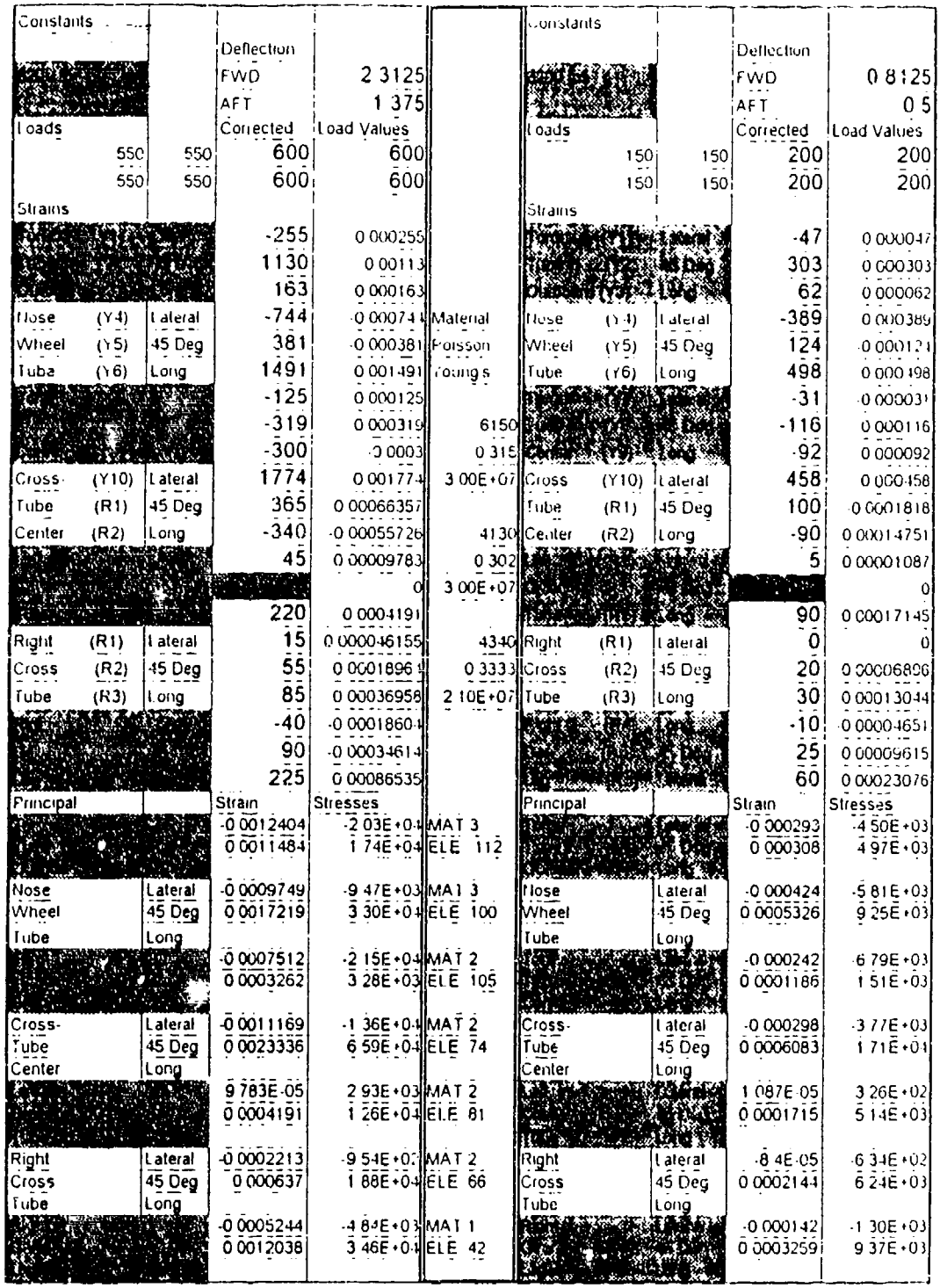
3200 lbs Aft Left, Center of Gravity

Constants			Deflection			Constants			Deflection	
			FWD	1.25					FWD	2.25
			AFT	0.6875					AFT	1.4375
Loads			Corrected	Load Values		Loads			Corrected	Load Values
	350	350	400	400			750	750	800	800
	350	350	400	400			560	560	610	610
Strains						Strains				
			-156	-0.000154					-209	-0.000209
			564	0.000567					1022	0.001022
			82	0.000082					120	0.00012
Nose	(Y4)	Lateral	-372	-0.000372	Material	Nose	(Y4)	Lateral	-570	-0.00057
Wheel	(Y5)	45 Deg	191	-0.000191	Poisson	Wheel	(Y5)	45 Deg	318	-0.000318
Tube	(Y6)	Long	770	0.00077	Young s	Tube	(Y6)	Long	1302	0.001302
			-50	-0.00005					-99	-0.000099
			192	-0.000192	6150				-304	0.000304
			173	0.000173	0.315				-284	-0.000284
Cross-	(Y10)	Lateral	955	0.000955	3.00E+07	Cross-	(Y10)	Lateral	1975	0.001975
Tube	(R1)	45 Deg	205	-0.00037269		Tube	(R1)	45 Deg	400	-0.0007272
Center	(R2)	Long	-160	-0.00026224	4130	Center	(R2)	Long	-360	-0.00059004
			225	0.00048915	0.302				55	0.00011957
				0	3.00E+07					0
			170	0.00032385					260	0.0004953
Right	(R1)	Lateral	5	0.000015385	4340	Right	(R1)	Lateral	20	0.00006154
Cross	(R2)	45 Deg	40	-0.00013792	0.3333	Cross	(R2)	45 Deg	55	-0.00018964
Tube	(R3)	Long	60	0.00026088	2.10E+07	Tube	(R3)	Long	80	0.00034784
			-20	-0.00009302					-45	-0.0002093
			40	-0.00015384					90	-0.00034614
			110	0.00042306					235	0.00090381
Principal			Strain	Stresses		Principal			Strain	Stresses
			-0.0006455	-1.07E+04	MAT 3				-0.001124	-1.84E+04
			0.0005735	8.47E+03	ELE 112				0.0010346	1.56E+04
Nose		Lateral	-0.0004925	-4.62E+03	MAT 3	Nose		Lateral	-0.000793	-6.73E+03
Wheel		45 Deg	0.0008905	1.72E+04	ELE 100	Wheel		45 Deg	0.0015253	2.98E+04
Tube		Long				Tube		Long		
			-0.0002154	-3.74E+03	MAT 2				-0.000696	-1.98E+04
			0.0003384	9.02E+03	ELE 105				0.0003126	3.38E+03
Cross-		Lateral	-0.0005957	-6.82E+03	MAT 2	Cross-		Lateral	-0.001221	1.43E+04
Tube		45 Deg	0.0012884	3.66E+04	ELE 74	Tube		45 Deg	0.0026057	7.38E+04
Center		Long				Center		Long		
			0.0004892	1.47E+04	MAT 2				0.0001196	3.59E+03
			0.0003239	9.72E+03	ELE 81				0.0004953	1.49E+04
Right		Lateral	-0.000164	-1.02E+03	MAT 2	Right		Lateral	-0.000215	-8.69E+02
Cross		45 Deg	0.0004402	1.29E+04	ELE 66	Cross		45 Deg	0.0006242	1.85E+04
Tube		Long				Tube		Long		
			-0.0002452	-2.13E+03	MAT 1				0.000542	-5.08E+03
			0.0005752	1.66E+04	ELE 42				0.0012364	3.55E+04

3200 lbs Centerline, Center of Gravity

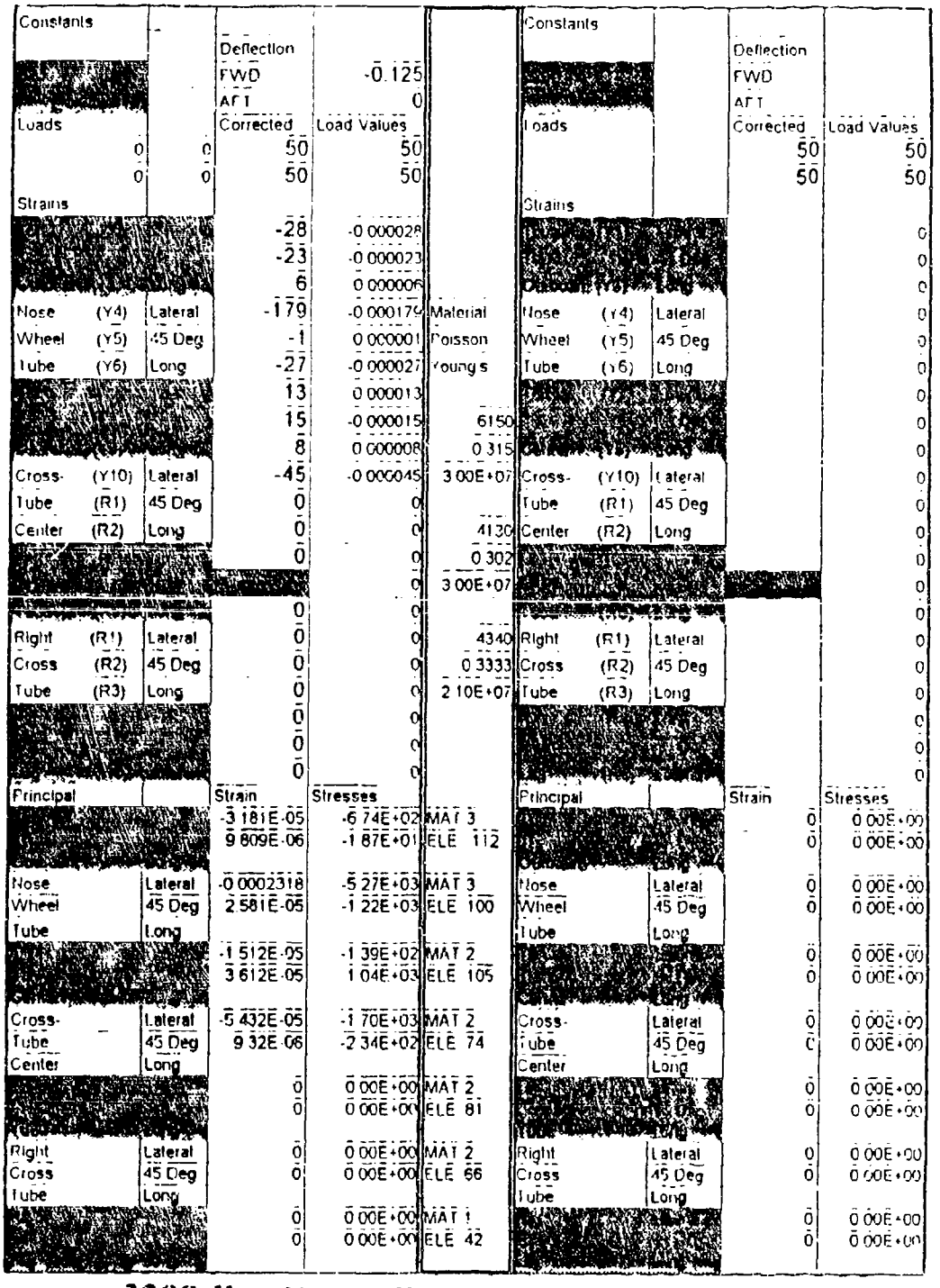
Constants									
			Deflection					Deflection	
[redacted]			FWD	2 5		[redacted]		FWD	2 4375
			AFT	1 9375				AFT	1 875
Loads			Corrected	Load Values		Loads		Corrected	Load Values
	1040	1040	1090	1090			950	950	1000	1000
	560	560	610	610			560	560	610	610
Strains						Strains				
[redacted]			-226	-0 000226		[redacted]			-214	-0 000214
			1123	0 001123					1091	0 001091
			150	0 00015					143	0 000143
Nose	(Y4)	Lateral	-370	-0 00037	Material	Nose	(Y4)	Lateral	-171	-0 000171
Wheel	(Y5)	45 Deg	360	0 00036	Poisson	Wheel	(Y5)	45 Deg	360	0 00036
Tube	(Y6)	Long	1430	0 00143	Young's	Tube	(Y6)	Long	1415	0 001415
[redacted]			-117	-0 000117		[redacted]			-115	0 000115
			-319	0 000319	6150				-312	0 000312
			-302	-0 000302	0 315				-296	0 000296
Cross-	(Y10)	Lateral	2623	0 002623	3 00E+07	Cross-	(Y10)	Lateral	2562	0 002562
Tube	(R1)	45 Deg	545	0 00099081		Tube	(R1)	45 Deg	520	0 00094536
Center	(R2)	Long	-495	0 000811305	4130	Center	(R2)	Long	-480	0 00078672
[redacted]			75	0 00016305	0 302	[redacted]			70	0 00015218
				0	3 00E+07					0
			280	0 0005334					280	0 0005334
Right	(R1)	Lateral	40	0 00012308	4340	Right	(R1)	Lateral	30	0 00009231
Cross	(R2)	45 Deg	50	-0 0001724	0 3333	Cross	(R2)	45 Deg	50	-0 0001724
Tube	(R3)	Long	90	0 00039132	2 10E+07	Tube	(R3)	Long	90	0 00039132
[redacted]			-80	-0 00037208		[redacted]			-65	0 00030232
			130	-0 000-19998					130	0 00043998
			350	0 0013461					340	0 0013076-4
Principal			Strain	Stresses		Principal			Strain	Stresses
[redacted]			-0 0012141	-1 97E+04	MAT 3	[redacted]			-0 001176	-1 91E+04
			0 0011381	1 73E+04	ELE 112				0 0011051	1 68E+04
Nose		Lateral	-0 0007357	-3 24E+03	MAT 3	Nose		Lateral	-0 00064	-2 88E+02
Wheel		45 Deg	0 0017957	3 66E+04	ELE 100	Wheel		45 Deg	0 0018842	3 95E+04
Tube		Long				Tube		Long		
[redacted]			-0 000746	-2 14E+04	MAT 2	[redacted]			-0 000731	-2 09E+04
			0 000327	3 36E+03	ELE 105				0 0003199	3 27E+03
Cross-		Lateral	-0 0016527	-2 00E+04	MAT 2	Cross-		Lateral	-0 001599	-1 89E+04
Tube		45 Deg	0 0034643	9 79E+04	ELE 74	Tube		45 Deg	0 0033944	9 61E+04
Center		Long				Center		Long		
[redacted]			0 0001631	4 89E+03	MAT 2	[redacted]			0 0001522	4 57E+03
			0 0005334	1 60E+04	ELE 81				0 0005334	1 60E+04
Right		Lateral	-0 0001928	6 85E+02	MAT 2	Right		Lateral	-0 000199	2 46E+02
Cross		45 Deg	0 0007072	2 14E+04	ELE 66	Cross		45 Deg	0 0006822	2 05E+04
Tube		Long				Tube		Long		
[redacted]			-0 0008215	-8 52E+03	MAT 1	[redacted]			-0 000783	-7 32E+03
			0 0017955	5 12E+04	ELE 42				0 0017885	5 13E+04

3200 lbs Centerline, Center of Gravity



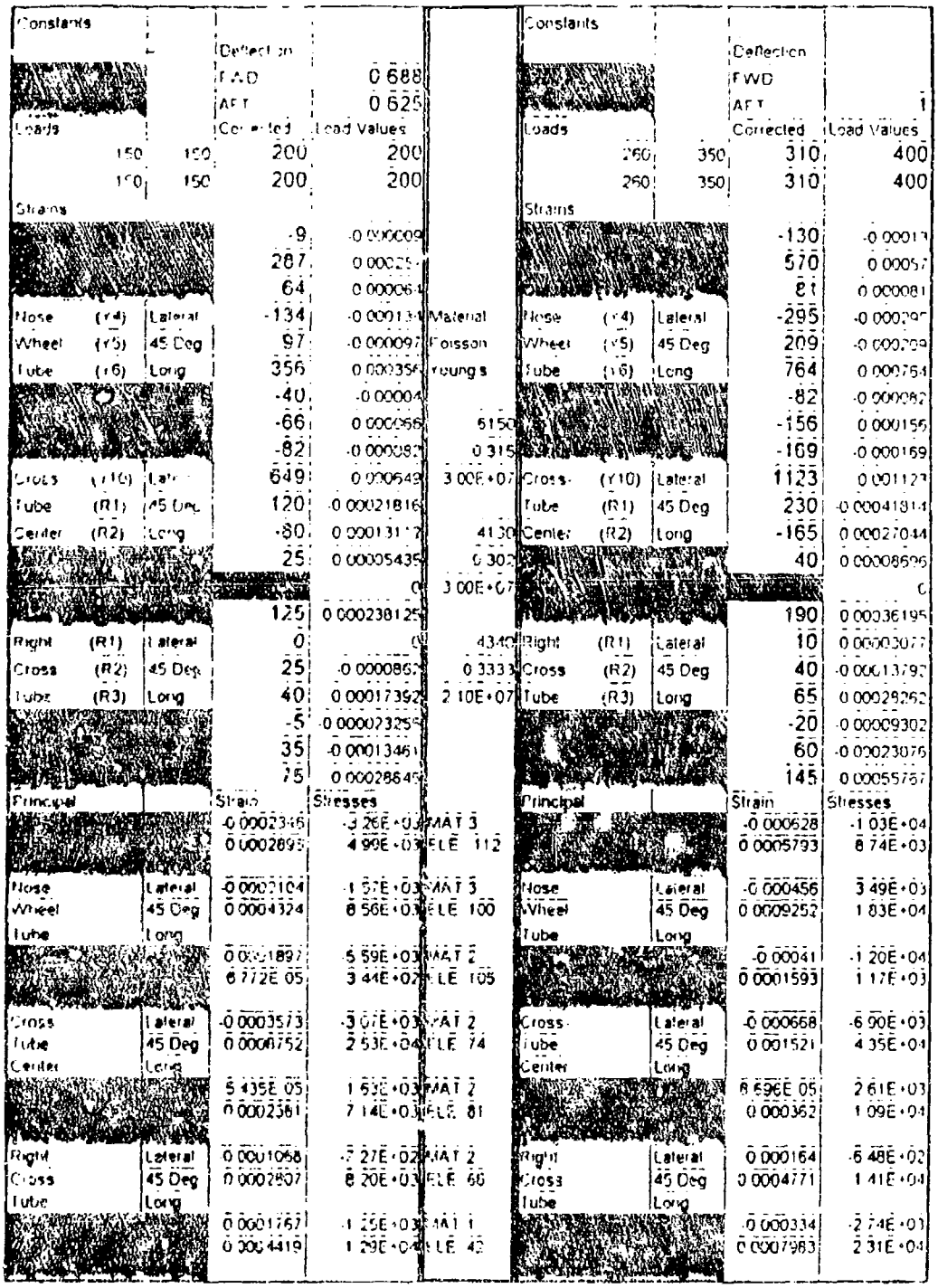
Constants			Deflection			Constants			Deflection	
[redacted]			FWD	2 3125		[redacted]			FWD	0 8125
[redacted]			AFT	1 375		[redacted]			AFT	0 5
Loads			Corrected	Load Values		Loads			Corrected	Load Values
	550	550	600	600			150	150	200	200
	550	550	600	600			150	150	200	200
Strains						Strains				
[redacted]			-255	0 000255		[redacted]			-47	0 000047
[redacted]			1130	0 00113		[redacted]			303	0 000303
[redacted]			163	0 000163		[redacted]			62	0 000062
Nose	(Y4)	Lateral	-744	-0 000744	Material	Nose	(Y4)	Lateral	-389	0 000389
Wheel	(Y5)	45 Deg	381	-0 000381	Poisson	Wheel	(Y5)	45 Deg	124	-0 000124
Tube	(Y6)	Long	1491	0 001491	Youngs	Tube	(Y6)	Long	498	0 000498
[redacted]			-125	0 000125		[redacted]			-31	-0 000031
[redacted]			-319	0 000319	6150	[redacted]			-116	0 000116
[redacted]			-300	-0 0003	0 315	[redacted]			-92	0 000092
Cross-	(Y10)	Lateral	1774	0 001774	3 00E+07	Cross	(Y10)	Lateral	458	0 000458
Tube	(R1)	45 Deg	365	0 00066357		Tube	(R1)	45 Deg	100	-0 0001818
Center	(R2)	Long	-340	-0 00055726	4130	Center	(R2)	Long	-90	0 00014751
[redacted]			45	0 00009783	0 302	[redacted]			5	0 00001087
[redacted]				0	3 00E+07	[redacted]				0
[redacted]			220	0 0004191		[redacted]			90	0 00017145
Right	(R1)	Lateral	15	0 00004615	4340	Right	(R1)	Lateral	0	0
Cross	(R2)	45 Deg	55	0 0001896	0 3333	Cross	(R2)	45 Deg	20	0 00006896
Tube	(R3)	Long	85	0 00036958	2 10E+07	Tube	(R3)	Long	30	0 00013044
[redacted]			-40	-0 0001860		[redacted]			-10	-0 0000465
[redacted]			90	-0 0003461		[redacted]			25	0 00009615
[redacted]			225	0 00086535		[redacted]			60	0 00023076
Principal			Strain	Stresses		Principal			Strain	Stresses
[redacted]			-0 0012404	-2 03E+04	MAT 3	[redacted]			-0 000293	-4 50E+03
[redacted]			0 0011484	1 74E+04	ELE 112	[redacted]			0 000308	4 97E+03
Nose		Lateral	-0 0009749	-9 47E+03	MAT 3	Nose		Lateral	-0 000424	-5 81E+03
Wheel		45 Deg	0 0017219	3 30E+04	ELE 100	Wheel		45 Deg	0 0005326	9 25E+03
Tube		Long				Tube		Long		
[redacted]			-0 0007512	-2 15E+04	MAT 2	[redacted]			-0 000242	-6 79E+03
[redacted]			0 0003262	3 28E+03	ELE 105	[redacted]			0 0001186	1 51E+03
Cross-		Lateral	-0 0011169	-1 36E+04	MAT 2	Cross-		Lateral	-0 000298	-3 77E+03
Tube		45 Deg	0 0023336	6 59E+04	ELE 74	Tube		45 Deg	0 0006083	1 71E+04
Center		Long				Center		Long		
[redacted]			9 783E-05	2 93E+03	MAT 2	[redacted]			1 087E-05	3 26E+02
[redacted]			0 0004191	1 26E+04	ELE 81	[redacted]			0 0001715	5 14E+03
Right		Lateral	-0 0002213	-9 54E+03	MAT 2	Right		Lateral	-8 4E-05	-6 34E+02
Cross		45 Deg	0 000637	1 88E+04	ELE 66	Cross		45 Deg	0 0002144	6 24E+03
Tube		Long				Tube		Long		
[redacted]			-0 0005244	-4 84E+03	MAT 1	[redacted]			-0 000142	-1 30E+03
[redacted]			0 0012038	3 46E+04	ELE 42	[redacted]			0 0003259	9 37E+03

3200 lbs Centerline, Center of Gravity



Constants					Constants			
		Deflection					Deflection	
		FWD	-0.125				FWD	
		AFT	0				AFT	
Loads		Corrected	Load Values		Loads		Corrected	Load Values
0	0	50	50				50	50
0	0	50	50				50	50
Strains					Strains			
		-28	-0.000028					0
		-23	-0.000023					0
		6	0.000006					0
Nose (Y4)	Lateral	-179	-0.000179	Material	Nose (Y4)	Lateral		0
Wheel (Y5)	45 Deg	-1	0.000001	Poisson	Wheel (Y5)	45 Deg		0
Tube (Y6)	Long	-27	-0.000027	Young's	Tube (Y6)	Long		0
		13	0.000013					0
		15	-0.000015	6150				0
		8	0.000008	0.315				0
Cross- (Y10)	Lateral	-45	-0.000045	3.00E+07	Cross- (Y10)	Lateral		0
Tube (R1)	45 Deg	0	0		Tube (R1)	45 Deg		0
Center (R2)	Long	0	0	4130	Center (R2)	Long		0
		0	0	0.302				0
			0	3.00E+07				0
		0	0					0
Right (R1)	Lateral	0	0	4340	Right (R1)	Lateral		0
Cross (R2)	45 Deg	0	0	0.3333	Cross (R2)	45 Deg		0
Tube (R3)	Long	0	0	2.10E+07	Tube (R3)	Long		0
		0	0					0
		0	0					0
		0	0					0
Principal		Strain	Stresses		Principal		Strain	Stresses
		-3.181E-05	-6.74E+02	MAT 3			0	0.00E+00
		9.809E-06	-1.87E+01	ELE 112			0	0.00E+00
Nose	Lateral	-0.0002318	-5.27E+03	MAT 3	Nose	Lateral	0	0.00E+00
Wheel	45 Deg	2.581E-05	-1.22E+03	ELE 100	Wheel	45 Deg	0	0.00E+00
Tube	Long				Tube	Long		
		-1.512E-05	-1.39E+02	MAT 2			0	0.00E+00
		3.612E-05	1.04E+03	ELE 105			0	0.00E+00
Cross-	Lateral	-5.432E-05	-1.70E+03	MAT 2	Cross-	Lateral	0	0.00E+00
Tube	45 Deg	9.32E-06	-2.34E+02	ELE 74	Tube	45 Deg	0	0.00E+00
Center	Long				Center	Long		
		0	0.00E+00	MAT 2			0	0.00E+00
		0	0.00E+00	ELE 81			0	0.00E+00
Right	Lateral	0	0.00E+00	MAT 2	Right	Lateral	0	0.00E+00
Cross	45 Deg	0	0.00E+00	ELE 66	Cross	45 Deg	0	0.00E+00
Tube	Long				Tube	Long		
		0	0.00E+00	MAT 1			0	0.00E+00
		0	0.00E+00	ELE 42			0	0.00E+00

3200 lbs Centerline, Center of Gravity



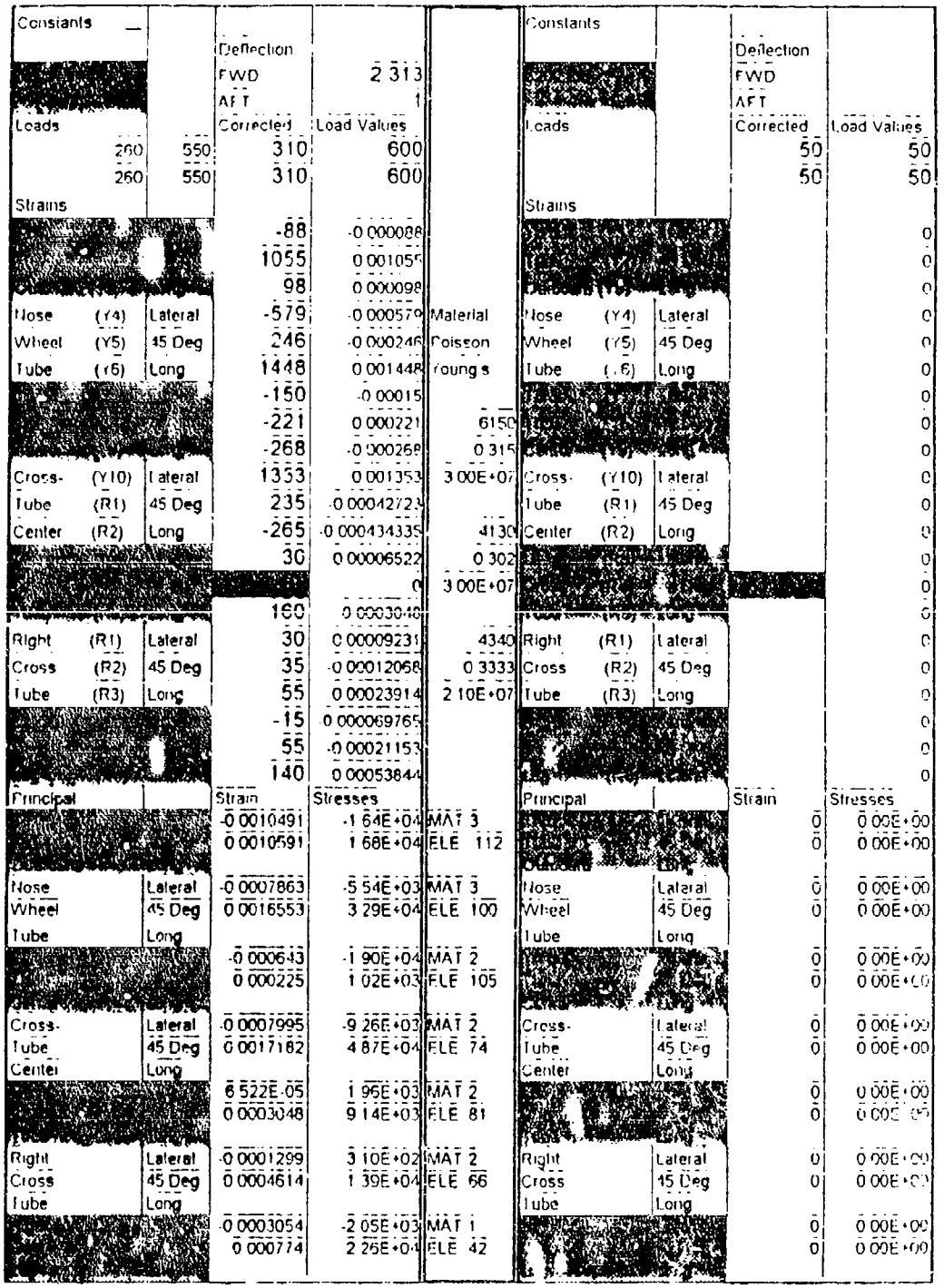
Constants			Deflection		
			FWD	0.688	
			AFT	0.625	
Loads			Corrected	Load Values	
	150	150	200	200	
	150	150	200	200	
Strains					
			-9	-0.000009	
			287	0.000287	
			64	0.000064	
Nose	(Y4)	Lateral	-134	-0.000134	Material
Wheel	(Y5)	45 Deg	97	-0.000097	Poisson
Tube	(Y6)	Long	356	0.000356	Youngs
			-40	-0.00004	
			-66	0.000066	6150
			-82	-0.000082	0.315
Cross	(Y10)	Lateral	649	0.000649	3.00E+07
Tube	(R1)	45 Deg	120	-0.00021816	
Center	(R2)	Long	-80	0.000131	4130
			25	0.00005435	0.302
				0	3.00E+07
			125	0.00023812	
Right	(R1)	Lateral	0	0	4340
Cross	(R2)	45 Deg	25	-0.000086	0.3333
Tube	(R3)	Long	40	0.00017392	2.10E+07
			-5	-0.000023	
			35	-0.00013461	
			75	0.00028845	
Principal			Strain	Stresses	
			-0.0002346	-3.26E+03	MAT 3
		31	0.0002895	4.99E+03	ELE 112
Nose		Lateral	-0.0002104	-1.57E+03	MAT 3
Wheel		45 Deg	0.0004324	8.56E+03	ELE 100
Tube		Long			
			0.0001897	-5.59E+03	MAT 2
			6.772E-05	3.44E+07	ELE 105
Cross		Lateral	-0.0003573	-3.07E+03	MAT 2
Tube		45 Deg	0.0006752	2.53E+04	ELE 74
Center		Long			
			5.435E-05	1.63E+03	MAT 2
			0.0002581	7.14E+03	ELE 81
Right		Lateral	0.0001058	-7.27E+02	MAT 2
Cross		45 Deg	0.0002807	8.20E+03	ELE 66
Tube		Long			
			0.0001767	-1.29E+03	MAT 1
			0.0004419	1.29E+04	ELE 42

Constants			Deflection		
			FWD		
			AFT		1
Loads			Corrected	Load Values	
	260	350	310	400	
	260	350	310	400	
Strains					
			-130	-0.00013	
			570	0.00057	
			81	0.000081	
Nose	(Y4)	Lateral	-295	-0.000295	
Wheel	(Y5)	45 Deg	209	-0.000209	
Tube	(Y6)	Long	764	0.000764	
			-82	-0.000082	
			-156	0.000156	
			-169	-0.000169	
Cross	(Y10)	Lateral	1123	0.001123	
Tube	(R1)	45 Deg	230	-0.00041814	
Center	(R2)	Long	-165	0.00027044	
			40	0.00008696	
				0	
			190	0.00036195	
Right	(R1)	Lateral	10	0.00003077	
Cross	(R2)	45 Deg	40	-0.00013792	
Tube	(R3)	Long	65	0.00029262	
			-20	-0.00009302	
			60	-0.00023076	
			145	0.00055757	
Principal			Strain	Stresses	
			-0.000628	-1.03E+04	
			0.0005793	8.74E+03	
Nose		Lateral	-0.000456	3.49E+03	
Wheel		45 Deg	0.0009252	1.83E+04	
Tube		Long			
			-0.00041	-1.20E+04	
			0.0001593	1.17E+03	
Cross		Lateral	-0.000668	-6.90E+03	
Tube		45 Deg	0.001521	4.35E+04	
Center		Long			
			8.696E-05	2.61E+03	
			0.000362	1.09E+04	
Right		Lateral	0.000164	-6.48E+02	
Cross		45 Deg	0.0004771	1.41E+04	
Tube		Long			
			-0.000334	-2.74E+03	
			0.0007983	2.31E+04	

3200 lbs Forward Left, Center of Gravity

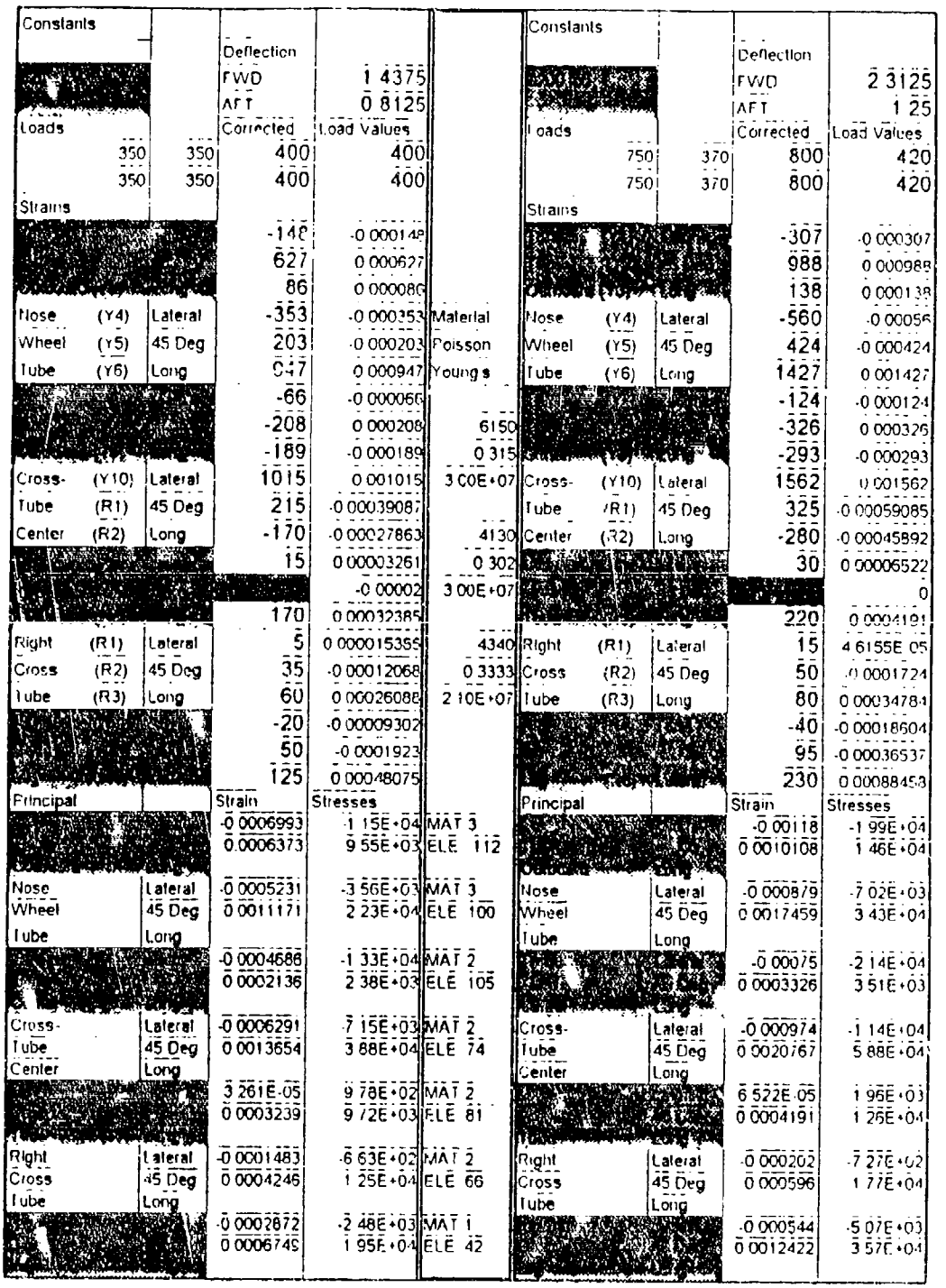
Constants					Constants			
[redacted]		Deflection			[redacted]		Deflection	
		FWD	1 593				FWD	2 75
		AFT	1 25				AFT	1 25
Loads		Corrected	Load Values		Loads		Corrected	Load Values
260	750	310	800		260	950	310	1000
260	750	310	800		260	950	310	1000
Strains					Strains			
[redacted]		-64	-0 000064		[redacted]		-69	-0 000069
		1312	0 001312				1458	0 001458
		83	0 000083				99	0 000099
Nose (Y4)	Lateral	-520	-0 00052	Material	Nose (Y4)	Lateral	-644	-0 000644
Wheel (Y5)	45 Deg	215	-0 000215	Poisson	Wheel (Y5)	45 Deg	164	-0 000164
Tube (Y6)	Long	1658	0 001658	Young s	Tube (Y6)	Long	1768	0 001768
[redacted]		-191	-0 000191		[redacted]		-192	-0 000192
		-255	0 000255	6150			-270	0 00027
		-311	-0 000311	0 315			-347	-0 000347
Cross- (Y10)	Lateral	1579	0 001579	3 00E+07	Cross- (Y10)	Lateral	1731	0 001731
Tube (R1)	45 Deg	270	-0 00049086		Tube (R1)	45 Deg	295	0 00053631
Center (R2)	Long	-310	-0 00050609	4130	Center (R2)	Long	-320	-0 00052448
[redacted]		35	0 00007609	0 302	[redacted]		45	0 00009783
			0	3 00E+07				0
		195	0 000371475				205	0 00039053
Right (R1)	Lateral	20	0 0000615	4340	Right (R1)	Lateral	25	7 5925E 05
Cross (R2)	45 Deg	30	-0 00010344	0 3333	Cross (R2)	45 Deg	40	-0 00013792
Tube (R3)	Long	60	0 00026088	2 10E+07	Tube (R3)	Long	65	0 00028252
[redacted]		-15	-0 000059765		[redacted]		-15	-6 9765E 05
		80	-0 00030768				60	-0 00023076
		150	0 0005769				145	0 00055767
Principal		Strain	Stresses		Principal		Strain	Stresses
[redacted]		-0 0012951	-2 02E+04	MAT 3	[redacted]		-0 00143	-2 23E+04
		0 0013141	2 08E+04	ELE 112			0 0014604	2 32E+04
Nose	Lateral	-0 0006536	-4 99E+03	MAT 3	Nose	Lateral	-0 000846	-4 47E+03
Wheel	45 Deg	0 001874	3 77E+04	ELE 100	Wheel	45 Deg	0 0019697	3 99E+04
Tube	Long				Tube	Long		
[redacted]		-0 0007605	-2 25E+04	MAT 2	[redacted]		-0 000815	-2 41E+04
		0 0002585	9 53E+02	ELE 105			0 0002755	9 75E+02
Cross-	Lateral	-0 0009282	-1 07E+04	MAT 2	Cross-	Lateral	-0 001	-1 10E+04
Tube	45 Deg	0 0019991	5 67E+04	ELE 74	Tube	45 Deg	0 0022065	6 29E+04
Center	Long				Center	Long		
[redacted]		7 609E 05	2 28E+03	MAT 2	[redacted]		9 783E 05	2 93E+03
		0 0003715	1 11E+04	ELE 81			0 0003905	1 17E+04
Right	Lateral	-0 0001216	4 13E+02	MAT 2	Right	Lateral	-0 000154	3 25E+01
Cross	45 Deg	0 000444	1 34E+04	ELE 56	Cross	45 Deg	0 0005137	1 54E+04
Tube	Long				Tube	Long		
[redacted]		-0 0003942	-3 67E+03	MAT 1	[redacted]		-0 000325	-2 30E+03
		0 0009013	2 59E+04	ELE 42			0 000813	2 37E+04

3200 lbs Forward Left, Center of Gravity



Constants		Deflection			Constants		Deflection	
[redacted]		FWD	2 313		[redacted]		FWD	
		AFT	1				AFT	
Loads		Corrected	Load Values		Loads		Corrected	Load Values
260	550	310	600				50	50
260	550	310	600				50	50
Strains					Strains			
[redacted]		-88	-0 000088		[redacted]			0
		1055	0 001055					0
		98	0 000098					0
Nose (Y4)	Lateral	-579	-0 000579	Material	Nose (Y4)	Lateral		0
Wheel (Y5)	45 Deg	246	-0 000246	Poisson	Wheel (Y5)	45 Deg		0
Tube (Y6)	Long	1448	0 001448	Young s	Tube (Y6)	Long		0
[redacted]		-150	-0 00015		[redacted]			0
		-221	0 000221	6150				0
		-268	-0 000268	0 315				0
Cross- (Y10)	Lateral	1353	0 001353	3 00E+07	Cross- (Y10)	Lateral		0
Tube (R1)	45 Deg	235	-0 00042723		Tube (R1)	45 Deg		0
Center (R2)	Long	-265	-0 000434335	4130	Center (R2)	Long		0
[redacted]		30	0 00006522	0 302	[redacted]			0
		0	0	3 00E+07				0
		160	0 000030					0
Right (R1)	Lateral	30	0 00009231	4340	Right (R1)	Lateral		0
Cross (R2)	45 Deg	35	-0 00012068	0 3333	Cross (R2)	45 Deg		0
Tube (R3)	Long	55	0 00023914	2 10E+07	Tube (R3)	Long		0
[redacted]		-15	-0 000069765		[redacted]			0
		55	-0 00021153					0
		140	0 00053844					0
Principal		Strain	Stresses		Principal		Strain	Stresses
[redacted]		-0 0010491	-1 64E+04	MAT 3	[redacted]		0	0 00E+00
		0 0010591	1 68E+04	ELE 112			0	0 00E+00
Nose	Lateral	-0 0007863	-5 54E+03	MAT 3	Nose	Lateral	0	0 00E+00
Wheel	45 Deg	0 0016553	3 29E+04	ELE 100	Wheel	45 Deg	0	0 00E+00
Tube	Long				Tube	Long		
[redacted]		-0 000643	-1 90E+04	MAT 2	[redacted]		0	0 00E+00
		0 000225	1 02E+03	ELE 105			0	0 00E+00
Cross-	Lateral	-0 0007995	-9 26E+03	MAT 2	Cross-	Lateral	0	0 00E+00
Tube	45 Deg	0 0017182	4 87E+04	ELE 74	Tube	45 Deg	0	0 00E+00
Center	Long				Center	Long		
[redacted]		6 522E-05	1 96E+03	MAT 2	[redacted]		0	0 00E+00
		0 0003048	9 14E+03	ELE 81			0	0 00E+00
Right	Lateral	-0 0001299	3 10E+02	MAT 2	Right	Lateral	0	0 00E+00
Cross	45 Deg	0 0004614	1 39E+04	ELE 66	Cross	45 Deg	0	0 00E+00
Tube	Long				Tube	Long		
[redacted]		-0 0003054	-2 05E+03	MAT 1	[redacted]		0	0 00E+00
		0 000774	2 26E+04	ELE 42			0	0 00E+00

3200 lbs Forward Left, Center of Gravity



Constants		Deflection		
		FWD	1 4375	
		AFT	0 8125	
Loads		Corrected	Load Values	
350	350	400	400	
350	350	400	400	
Strains				
		-148	-0 000148	
		627	0 000627	
		86	0 000086	
Nose (Y4)	Lateral	-353	-0 000353	Material
Wheel (Y5)	45 Deg	203	-0 000203	Poisson
Tube (Y6)	Long	947	0 000947	Young s
		-66	-0 000066	
		-208	0 000208	6150
		-189	-0 000189	0 315
Cross- (Y10)	Lateral	1015	0 001015	3 00E+07
Tube (R1)	45 Deg	215	-0 00039087	
Center (R2)	Long	-170	-0 00027863	4130
		15	0 00003261	0 302
			-0 00002	3 00E+07
		170	0 00032385	
Right (R1)	Lateral	5	0 000015385	4340
Cross (R2)	45 Deg	35	-0 00012068	0 3333
Tube (R3)	Long	60	0 00026088	2 10E+07
		-20	-0 00009302	
		50	-0 0001923	
		125	0 00048075	
Principal		Strain	Stresses	
		-0 0006993	-1 15E+04	MAT 3
		0 0006373	9 55E+03	ELE 112
Nose	Lateral	-0 0005231	-3 56E+03	MAT 3
Wheel	45 Deg	0 0011171	2 23E+04	ELE 100
Tube	Long			
		-0 0004686	-1 33E+04	MAT 2
		0 0002136	2 38E+03	ELE 105
Cross-	Lateral	-0 0006291	-7 15E+03	MAT 2
Tube	45 Deg	0 0013654	3 88E+04	ELE 74
Center	Long			
		3 261E-05	9 78E+02	MAT 2
		0 0003239	9 72E+03	ELE 81
Right	Lateral	-0 0001483	-6 63E+02	MAT 2
Cross	45 Deg	0 0004246	1 25E+04	ELE 66
Tube	Long			
		-0 0002872	-2 48E+03	MAT 1
		0 0006749	1 95E+04	ELE 42

Constants		Deflection		
		FWD	2 3125	
		AFT	1 25	
Loads		Corrected	Load Values	
750	370	800	420	
750	370	800	420	
Strains				
		-307	-0 000307	
		988	0 000988	
		138	0 000138	
Nose (Y4)	Lateral	-560	-0 00056	
Wheel (Y5)	45 Deg	424	-0 000424	
Tube (Y6)	Long	1427	0 001427	
		-124	-0 000124	
		-326	0 000326	
		-293	-0 000293	
Cross- (Y10)	Lateral	1562	0 001562	
Tube (R1)	45 Deg	325	-0 00059085	
Center (R2)	Long	-280	-0 00045892	
		30	0 00006522	
			0	
		220	0 0004191	
Right (R1)	Lateral	15	4 6155E-05	
Cross (R2)	45 Deg	50	-0 0001724	
Tube (R3)	Long	80	0 00034784	
		-40	-0 00018604	
		95	-0 00036537	
		230	0 00088453	
Principal		Strain	Stresses	
		-0 00118	-1 99E+04	
		0 0010108	1 46E+04	
Nose	Lateral	-0 0008/9	-7 02E+03	
Wheel	45 Deg	0 0017459	3 43E+04	
Tube	Long			
		-0 00075	-2 14E+04	
		0 0003326	3 51E+03	
Cross-	Lateral	-0 000974	-1 14E+04	
Tube	45 Deg	0 0020767	5 88E+04	
Center	Long			
		6 522E-05	1 96E+03	
		0 0004191	1 26E+04	
Right	Lateral	-0 000202	-7 27E+02	
Cross	45 Deg	0 000596	1 77E+04	
Tube	Long			
		-0 000544	-5 07E+03	
		0 0012422	3 57E+04	

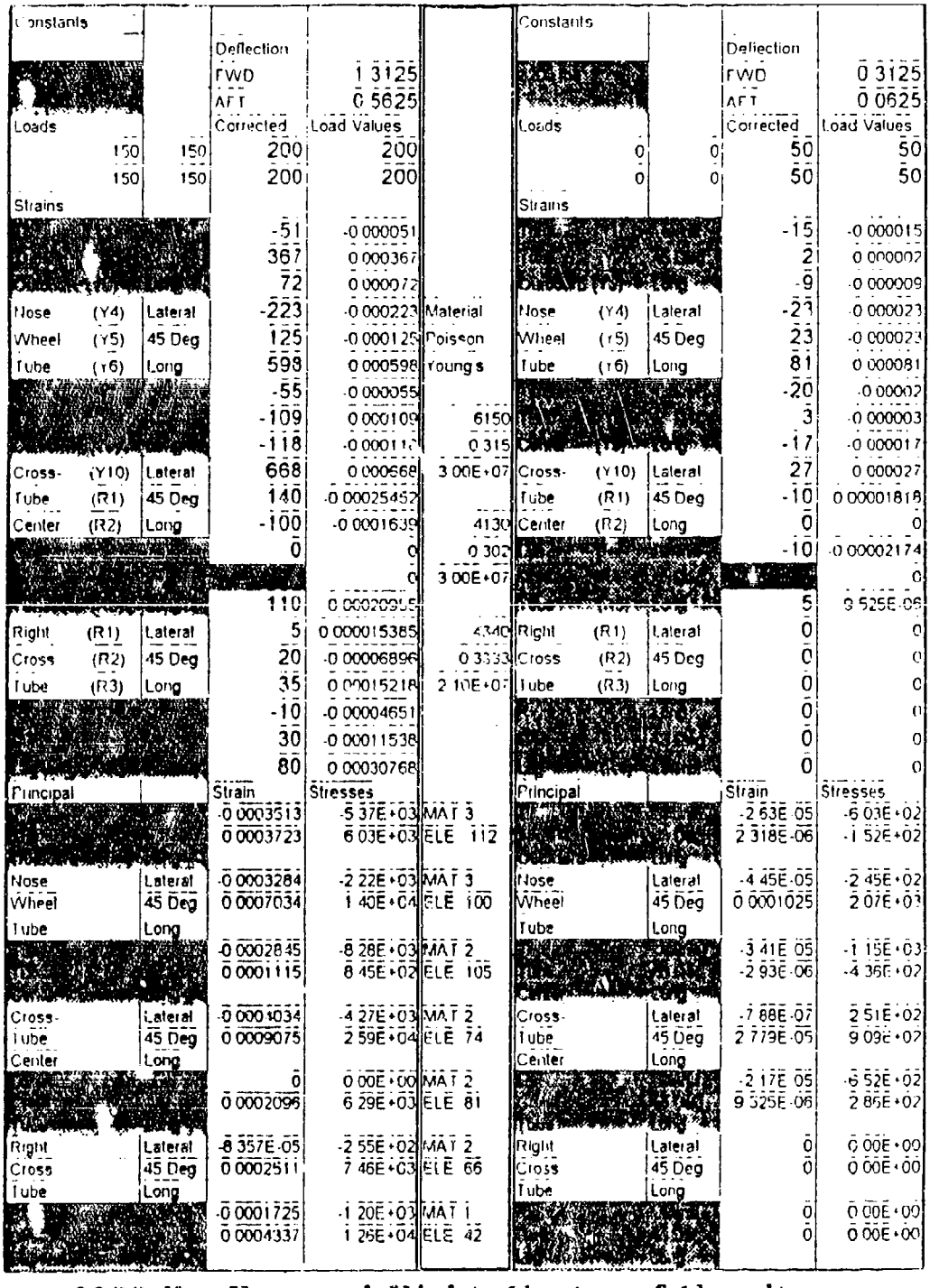
3200 lbs Forward Right, Center of Gravity

Constants			Deflection			Constants			Deflection	
			FWD	3 25					FWD	3 6875
			AFT	1 6875					AFT	1 25
Loads			Corrected	Load Values		Loads			Corrected	Load Values
	1150	370	1200	420			1230	370	1280	420
	1150	370	1200	420			1230	370	1280	420
Strains						Strains				
			-570	-0 00057					-654	-0 000654
			1410	0 00141					1586	0 001585
			209	0 000209					226	0 000226
Nose	(Y4)	Lateral	-828	-0 000828	Material	Nose	(Y4)	Lateral	-911	-0 000911
Wheel	(Y5)	45 Deg	675	-0 000675	Poisson	Wheel	(Y5)	45 Deg	739	-0 000739
Tube	(Y6)	Long	2073	0 002073	young s	Tube	(Y6)	Long	2280	0 00228
			-210	-0 00021					-187	-0 000187
			-449	0 000449	6150				-482	0 000482
			-410	-0 00041	0 315				-447	-0 000447
Cross-	(Y10)	Lateral	2229	0 002229	3 00E+07	Cross-	(Y10)	Lateral	2318	0 002318
Tube	(R1)	45 Deg	480	-0 00067264		Tube	(R1)	45 Deg	500	-0 000909
Center	(R2)	Long	-415	-0 000680185	4130	Center	(R2)	Long	-435	-0 00071297
			45	0 00009783	0 302				50	0 0001087
				0	3 00E+07					0
			255	0 00048578					255	0 00048578
Right	(R1)	Lateral	35	0 00010769	4340	Right	(R1)	Lateral	35	0 0001077
Cross	(R2)	45 Deg	55	-0 00018964	0 3333	Cross	(R2)	45 Deg	55	-0 00018964
Tube	(R3)	Long	90	0 00039132	2 10E+07	Tube	(R3)	Long	90	0 00039132
			-65	-0 00030231					-65	-0 00030232
			145	-0 0005576					150	-0 0005769
			370	0 00142302					370	0 00142302
Principal			Strain	Stresses		Principal			Strain	Stresses
			-0 001818	-3 15E+04	MAT 3				-0 002067	-3 59E+04
			0 001457	2 01E+04	ELE 112				0 001639	2 24E+04
Nose		Lateral	-0 0013236	-1 10E+04	MAT 3	Nose		Lateral	-0 001454	-1 21E+04
Wheel		45 Deg	0 0025686	5 03E+04	ELE 100	Wheel		45 Deg	0 0028227	5 52E+04
Tube		Long				Tube		Long		
			-0 0010756	-3 10E+04	MAT 2				-0 001127	-3 23E+04
			0 0004556	4 32E+03	ELE 105				0 0004925	5 03E+03
Cross-		Lateral	-0 001423	-1 73E+04	MAT 2	Cross-		Lateral	-0 001494	-1 82E+04
Tube		45 Deg	0 0029718	8 39E+04	ELE 74	Tube		45 Deg	0 0030886	8 72E+04
Center		Long				Center		Long		
			9 783E-05	2 93E+03	MAT 2				0 0001087	3 26E+03
			0 0004858	1 46E+04	ELE 81				0 0004858	1 46E+04
Right		Lateral	-0 000212	9 07E+01	MAT 2	Right		Lateral	-0 000212	9 07E+01
Cross		45 Deg	0 000711	2 14E+04	ELE 66	Cross		45 Deg	0 000711	2 14E+04
Tube		Long				Tube		Long		
			-0 0008518	-7 68E+03	MAT 1				-0 000867	-8 02E+03
			0 0019725	5 68E+04	ELE 42				0 0019878	5 71E+04

3200 lbs Forward Right, Center of Gravity

Constants			Deflection			Constants			Deflection	
[illegible]			FWD	3.4375		[illegible]			FWD	3.25
[illegible]			AFT	1.625		[illegible]			AFT	1.25
Loads			Corrected	Load Values		Loads			Corrected	Load Values
	950	370	1000	420			550	370	600	420
	950	370	1000	420			550	370	600	420
Strains						Strains				
[illegible]			-491	-0.000491		[illegible]			-281	-0.00028
[illegible]			1383	0.001383		[illegible]			1131	0.001131
[illegible]			199	0.000199		[illegible]			153	0.000153
Nose	(Y4)	Lateral	-784	-0.000784	Material	Nose	(Y4)	Lateral	-633	-0.000633
Wheel	(Y5)	45 Deg	579	0.000579	Poisson	Wheel	(Y5)	45 Deg	377	0.000377
Tube	(Y6)	Long	2022	0.002022	Young s	Tube	(Y6)	Long	1682	0.001682
[illegible]			-142	-0.000142		[illegible]			-113	-0.000113
[illegible]			-398	0.000398	6150	[illegible]			-308	0.000308
[illegible]			-385	-0.000385	0.315	[illegible]			-306	-0.000306
Cross-	(Y10)	Lateral	2146	0.002146	3.00E+07	Cross-	(Y10)	Lateral	1657	0.001657
Tube	(R1)	45 Deg	460	-0.00083628		Tube	(R1)	45 Deg	350	-0.0006363
Center	(R2)	Long	-400	-0.0006556	4130	Center	(R2)	Long	-305	-0.0004999
[illegible]			45	0.00009785	0.302	[illegible]			25	0.00005435
[illegible]				0	3.00E+07	[illegible]				0
[illegible]			250	0.00047625		[illegible]			205	0.00039053
Right	(R1)	Lateral	30	0.00009231	4340	Right	(R1)	Lateral	25	7.6925E-05
Cross	(R2)	45 Deg	50	-0.0001724	0.3333	Cross	(R2)	45 Deg	30	-0.00010344
Tube	(R3)	Long	80	0.00034784	2.10E+07	Tube	(R3)	Long	65	0.00028262
[illegible]			-60	0.00027906		[illegible]			-35	-0.00016279
[illegible]			130	-0.00049998		[illegible]			90	-0.00034611
[illegible]			310	0.00119226		[illegible]			205	0.00078843
Principal			Strain	Stresses		Principal			Strain	Stresses
[illegible]			-0.0017134	-2.93E+04	MAT 3	[illegible]			-0.001279	-2.11E+04
[illegible]			0.0014214	2.01E+04	ELE 112	[illegible]			0.0011505	1.71E+04
Nose		Lateral	-0.0012259	-9.56E+03	MAT 3	Nose		Lateral	-0.000943	-6.59E+03
Wheel		45 Deg	0.0024639	4.86E+04	ELE 100	Wheel		45 Deg	0.0019916	3.96E+04
Tube		Long				Tube		Long		
[illegible]			-0.0009361	-2.68E+04	MAT 2	[illegible]			-0.000736	-2.11E+04
[illegible]			0.0004091	4.17E+03	ELE 105	[illegible]			0.0003169	3.13E+03
Cross-		Lateral	-0.0013675	-1.67E+04	MAT 2	Cross-		Lateral	-0.001046	-1.26E+04
Tube		45 Deg	0.0028579	8.07E+04	ELE 74	Tube		45 Deg	0.002203	6.23E+04
Center		Long				Center		Long		
[illegible]			9.783E-05	2.93E+03	MAT 2	[illegible]			5.435E-05	1.63E+03
[illegible]			0.0004763	1.43E+04	ELE 81	[illegible]			0.0003905	1.17E+04
Right		Lateral	-0.0001927	-5.15E+01	MAT 2	Right		Lateral	-0.000122	7.84E+02
Cross		45 Deg	0.0006328	1.90E+04	ELE 66	Cross		45 Deg	0.0004811	1.47E+04
Tube		Long				Tube		Long		
[illegible]			-0.0007501	-7.53E+03	MAT 1	[illegible]			-0.0005	-4.84E+03
[illegible]			0.0016633	4.75E+04	ELE 42	[illegible]			0.0011255	3.22E+04

3200 lbs Forward Right, Center of Gravity



Constants		Deflection		
[redacted]		FWD	1 3125	
		AFT	0 5625	
Loads		Corrected	Load Values	
150	150	200	200	
150	150	200	200	
Strains				
[redacted]		-51	-0 000051	
		367	0 000367	
		72	0 000072	
Nose (Y4)	Lateral	-223	-0 000223	Material
Wheel (Y5)	45 Deg	125	-0 000125	Poisson
Tube (Y6)	Long	598	0 000598	Youngs
[redacted]		-55	-0 000055	
		-109	0 000109	6150
		-118	-0 000118	0 315
Cross- (Y10)	Lateral	668	0 000668	3 00E+07
Tube (R1)	45 Deg	140	-0 00025452	
Center (R2)	Long	-100	-0 0001639	4130
[redacted]		0	0	0 302
			0	3 00E+07
		110	0 00020995	
Right (R1)	Lateral	5	0 000015385	4340
Cross (R2)	45 Deg	20	-0 00006896	0 3333
Tube (R3)	Long	35	0 00015218	2 10E+07
[redacted]		-10	-0 00004651	
		30	-0 00011538	
		80	0 00030768	
Principal		Strain	Stresses	
[redacted]		-0 0003513	-5 37E+03	MAT 3
		0 0003723	6 03E+03	ELE 112
Nose	Lateral	-0 0003284	-2 22E+03	MAT 3
Wheel	45 Deg	0 0007034	1 40E+04	ELE 100
Tube	Long			
[redacted]		-0 0002845	-8 28E+03	MAT 2
		0 0001115	8 45E+02	ELE 105
Cross-	Lateral	-0 0001034	-4 27E+03	MAT 2
Tube	45 Deg	0 0009075	2 59E+04	ELE 74
Center	Long			
[redacted]		0	0 00E+00	MAT 2
		0 0002096	6 29E+03	ELE 81
Right	Lateral	-8 357E-05	-2 55E+02	MAT 2
Cross	45 Deg	0 0002511	7 46E+03	ELE 66
Tube	Long			
[redacted]		-0 0001725	-1 20E+03	MAT 1
		0 0004337	1 26E+04	ELE 42

Constants		Deflection		
[redacted]		FWD	0 3125	
		AFT	0 0625	
Loads		Corrected	Load Values	
0	0	50	50	
0	0	50	50	
Strains				
[redacted]		-15	-0 000015	
		2	0 000002	
		-9	-0 000009	
Nose (Y4)	Lateral	-23	-0 000023	
Wheel (Y5)	45 Deg	23	-0 000023	
Tube (Y6)	Long	81	0 000081	
[redacted]		-20	-0 00002	
		3	-0 000003	
		-17	-0 000017	
Cross- (Y10)	Lateral	27	0 000027	
Tube (R1)	45 Deg	-10	0 00001818	
Center (R2)	Long	0	0	
[redacted]		-10	-0 00002174	
			0	
		5	9 525E-06	
Right (R1)	Lateral	0	0	
Cross (R2)	45 Deg	0	0	
Tube (R3)	Long	0	0	
[redacted]		0	0	
		0	0	
		0	0	
Principal		Strain	Stresses	
[redacted]		-2 63E-05	-6 03E+02	
		2 318E-06	-1 52E+02	
Nose	Lateral	-4 45E-05	-2 45E+02	
Wheel	45 Deg	0 0001025	2 07E+03	
Tube	Long			
[redacted]		-3 41E-05	-1 15E+03	
		-2 93E-06	-4 36E+02	
Cross-	Lateral	-7 88E-07	2 51E+02	
Tube	45 Deg	2 779E-05	9 09E+02	
Center	Long			
[redacted]		-2 17E-05	-6 52E+02	
		9 525E-06	2 86E+02	
Right	Lateral	0	0 00E+00	
Cross	45 Deg	0	0 00E+00	
Tube	Long			
[redacted]		0	0 00E+00	
		0	0 00E+00	

3200 lbs Forward Right, Center of Gravity

REFERENCES

Alloy Digest, SA-26 (AISI 6150) 1955
AL-179 (AL 7075) 1973
SA 23 (AISI 4130) 1988.

Anderson, John, *Fundamentals of Aerodynamics,* McGraw-Hill, NY,pp 228-236, 199i

Coleman, R.P. & Stempin, C.W. "A Preliminary Theoretical Study of Aerodynamic Instability of a Two-Bladed Helicopter Rotor", *NACA RM L6H23*, pp all, 1946.

Federal Aviation Regulations (FAR), Part 29, U.S. Government Printing Office, pp 489-497, 1992.

J. Roskam, *Airplane Design, Part IV: Layout Design of Landing Gear and Systems*, Ottawa, KS, pp 3-13, 1986.

TH-57B/C Aircraft NATOPS Flight Manual, 1987.

INITIAL DISTRIBUTION LIST

1.	Defense Technical Information Center Cameron Station Alexandria, VA 22304-6145	2
2.	Library, Code 0142 Naval Postgraduate School Monterey, CA 93943-5002	2
3.	Professor R. Kolar Code AA/Kj Naval Postgraduate School Monterey, CA 93943	2
4.	Professor G. Lindsey Code AA/Li Naval Postgraduate School Monterey, CA 93943	1
5.	LT N.L. Heckman, USN c/o Mr. John L. Heckman 4323 Sarah St. Burbank, CA 91505	4